TM02 TE16 TM02 TU16/TE16 RELIAB
TU16 CZTUAJO

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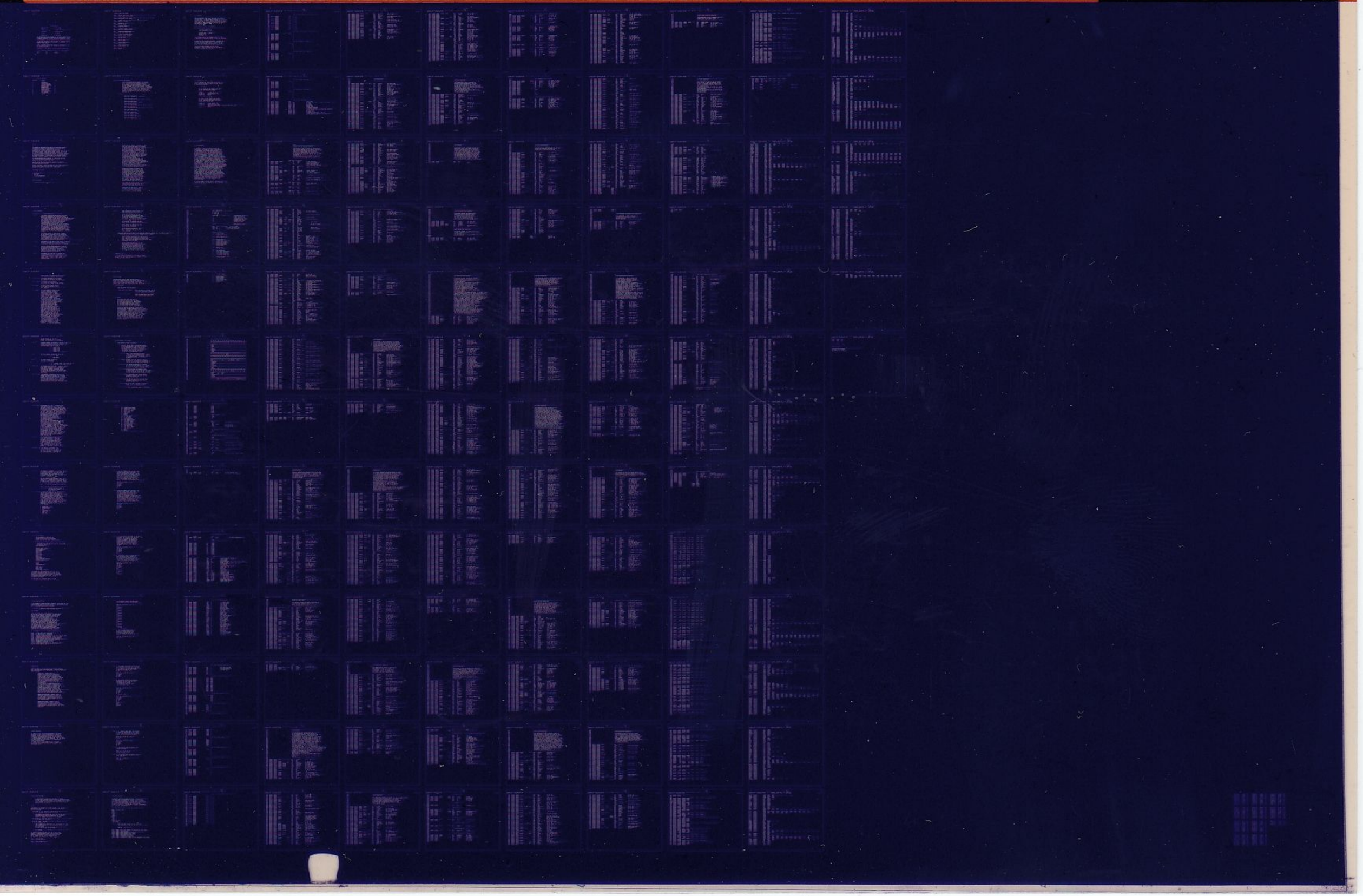

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IDENTIFICATION

PRODUCT CODE: AC-9447J-MC

PRODUCT TITLE: CZTUAJO TM02-TU16/TE16 RELIAB

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: R.B. BARNES

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1. ABSTRACT

THIS PROGRAM IS DESIGNED TO BE USED BY AN EXPERIENCED ENGINEER /TECHNICIAN FOR EVALUATION AND DEBUGGING OF MAG TAPE DRIVES. THE PROGRAM IS CAPABLE OF EXERCISING ANY TAPE DRIVE THAT CAN BE OPERATED ON A MASSBUS THROUGH THE TM02 MAG TAPE CONTROLLER. ANY TYPE OF TAPE DRIVE; NRZI,PE,7 OR 9 TRACK MAY BE USED. ANY NUMBER OF DRIVES, SINGLE OR MULTIDRIVE SYSTEMS, UP TO EIGHT (8), MAY BE TESTED BY A SINGLE EXECUTION OF THE PROGRAM. THIS FLEXIBILITY IS POSSIBLE BECAUSE THE PROGRAM HAS NO FIXED PARAMETERS OR TESTING SEQUENCE. THE ENTIRE TEST PLAN, INCLUDING PARAMETERS AND OPERATING SEQUENCE, IS DETERMINED BY THE OPERATOR THROUGH RESPONSES TO TELETYPE REQUESTS AND SETTING OF CONSOLE SWITCHES.

THE PROGRAM PROVIDES FOR TESTING OF ALL TAPE DRIVE FUNCTIONS SUCH AS WRITING,READING,REWINDING,TAPE POSITIONING,EOT - BOT SENSING AND ASSUMES A GOOD RH AND TM02.

HOWEVER; THE RH AND TM02 ARE TESTED SOMEWHAT INTRINSICALLY DURING THE TEST CYCLE IN ORDER TO PROVIDE FULL INFORMATION ABOUT ANY ERROR CONDITIONS DETECTED.

DURING A TEST CYCLE, CHECKS ARE MADE FOR STATUS ERRORS,DATA ERRORS, POSITION ERRORS,WORD COUNT AND CURRENT MEMORY ADDRESS ERRORS WHEREVER APPLICABLE AS DETECTED BY THE RH OR TM02.

2. REQUIREMENTS (HARDWARE)

A. ANY PDP-11 PROCESSOR - WITH OR WITHOUT HARDWARE SWITCH REGISTER
B. 8K OF CORE
C. TELETYPE
D. TM02 TAPE CONTROLLER
E. 1 TO 8 MAG TAPE DRIVES
F. MASSBUS CONTROLLER

3. LOADING PROCEDURE

USE STANDARD PROCEDURE FOR LOADING BINARY TAPES

4. STARTING PROCEDURE

THERE ARE FOUR (4) STARTING ADDRESSES THAT MAY BE USED:

A. 200(8): THIS ADDRESS MUST BE USED ON INITIAL START FROM LOAD AS ALL PARAMETERS ARE ENTERED FROM HERE. REQUESTS ARE PRINTED ON THE TELETYPE FOR ENTRY OF RH STARTING ADDRESS, VECTOR ADDRESS, DRIVE NUMBER(TM02 ADDRESS), SLAVE NUMBER, DENSITY,PARITY,FORMAT,RECORD COUNT,CHARACTER COUNT,PATTERN NUMBER,TAPE MARK AND STALL FOR READ,WRITE, AND TURNAROUND. ALL REPONSES SHOULD BE MADE IN OCTAL AND WITHIN THE LIMITS OF THE PARAMETER. A QUESTION MARK (?) WILL BE TYPED IF ANY CHARACTER ENTERED IS NOT BETWEEN 0 THRU 7 (OCTAL). THE CHARACTER MAY BE RETYPED FOLLOWING THE QUESTION MARK. IF THE RESPONSE IS NOT WITHIN ITS LIMITS. A QUESTION MARK (?) IS TYPED AND THE ENTIRE RESPONSE MAY BE RENTERED. SOME RESPONSES REQUIRE MORE THAN ONE (1) CHARACTER, BUT NONE REQUIRES MORE THAN SIX (6). RESPONSES OF MORE THAN ONE CHARACTER NEED NOT HAVE LEADING ZEROS AND SHOULD BE TERMINATED BY A CARRIAGE RETURN IF LESS THAN THE MAXIMUM NUMBER OF CHARACTERS IS INPUT.

B. 204(8): THIS ADDRESS SHOULD BE USED ANYTIME A RESTART OF THE PROGRAM IS NECESSARY AND THE PARAMETERS ENTERED AT THE INITIAL START OF 200(8) NEED NOT BE CHANGED. ALSO NOTE THAT ANY DATA PATTERN WHICH HAD BEEN GENERATED BY SETTING THE RANDOM DATA SWITCH (CONSOLE SWITCH EIGHT) WILL NOT BE OVERWRITTEN AND THERFORE IS HELD IN CORE FOR USE UNTIL CONSOLE SWITCH EIGHT(8) IS AGAIN SET AND THAT ALL STATISTICS WILL BE RETAINED.

C. 210(8): THIS ADDRESS IS THE SAME AS USING 204(8) IN THAT THE PREVIOUSLY SET PARAMETERS ARE USED; HOWEVER, THE DATA PATTERN IS RETURNED TO THE FIXED PATTERN ORIGINALLY CALLED FOR AT THE 200(8) START AND ALL STATISTICS ARE CLEARED TO ZERO.

D. 240(8): THIS IS A SPECIAL ADDRESS WHICH WILL CAUSE THE PROGRAM TO EXECUTE A PREDETERMINED TEST PLAN ON ALL AVAILABLE DRIVES AND SLAVES. THE ONLY INPUT REQUIRED BY THE OPERATOR IS A RESPONSE TO REQUESTS FOR THE RH ADDRESS, VECTOR ADDRESS, CONTINUOUS OPERATION OF THE SEQUENCE, AND NRZ ONLY. SEE ALSO SECTION 11 FOR DETAILS.

E. 300(8): THIS ADDRESS IS TO BE USED AS A RESTART ONLY AND WILL PERFORM JUST AS IN 200(8) EXCEPT THAT THE PARAMETER INPUT LIST IS SHORTENED. THE SHORT PARAMETER LIST CONSISTS OF DRIVE NUMBER, SLAVE NUMBER, DENSITY, PARITY, FORMAT, RECORD COUNT, CHARACTER COUNT, PATTERN, TAPE MARK, AND INTERCHANGE READ.

THE FOLLOWING IS AN EXPLANATION OF THE INITIAL START (200 OCTAL) REQUESTS AND RESPONSES:

REGISTER START: THE RESPONSE REQUIRED FOR THIS REQUEST IS TO ENTER THE ADDRESS OF THE FIRST RH REGISTER (CS1) AS A SIX DIGIT UNIBUS ADDRESS.

VECTOR ADDRESS: THE RESPONSE FOR THIS REQUEST IS TO ENTER THE INTERRUPT VECTOR ADDRESS USED BY THE RH AS A THREE (3) DIGIT ADDRESS.

DRIVE NUMBER: THE DRIVE NUMBER (MASSBUS ADDRESS OF THE TM02) IS ENTERED AS ONE (1) OCTAL CHARACTER AND MUST BE WITHIN THE LIMITS OF 0 THROUGH 7.

SLAVE NUMBER: THE SLAVE NUMBER IS ENTERED AS ONE (1) OCTAL CHARACTER AND MUST BE WITHIN THE LIMITS OF 0 THROUGH 7. WHEN THE SLAVE NUMBER HAS BEEN ENTERED AND IS LEGAL, THE PROGRAM TESTS FOR THE PRESENCE OF A SLAVE OF THAT NUMBER. IF THE SLAVE IS AVAILABLE A PRINTOUT OF 7 CHANNEL, IF APPLICABLE, AND ITS SERIAL NUMBER (IN BCD) WILL BE MADE TO ASSIST THE OPERATOR IN SETTING OF DENSITY, PARITY, AND FORMAT. A CHECK IS MADE FOR THE PROPER SETTING OF THE DRIVE TYPE REGISTER; IF WRONG, A MESSAGE IS PRINTED FOR INFORMATION ONLY. IF THE SLAVE IS NOT AVAILABLE, A MESSAGE STATING SO WILL BE PRINTED AND A NEW SLAVE NUMBER REQUEST WILL BE ISSUED. WHEN A GOOD SLAVE NUMBER HAS BEEN ENTERED, REQUESTS FOR OPERATING DENSITY PARITY AND FORMAT ARE MADE FOR THAT SLAVE AND SHOULD BE RESPONDED TO ACCORDING TO THAT PARITICULAR SLAVE'S NEEDS. AS MANY AS EIGHT (8) SLAVE NUMBER REQUESTS MAY BE USED, HOWEVER, AT LEAST ONE MUST BE USED. THE SLAVE NUMBERS AND THEIR RESPECTIVE DENSITY, PARITY AND FORMAT MAY BE ENTERED IN ANY ORDER. THE INFORMATION FOR EACH SLAVE ENTERED IS LOADED INTO A TABLE FOR REFERENCE IN TESTING. IF LESS THAN EIGHT(8) SLAVES ARE REQUIRED, THEN RESPONDING TO THE SLAVE NUMBER REQUEST WITH A CARRIAGE RETURN WILL TERMINATE THE SLAVE ENTRIES AND CONTINUE TO THE NEXT PARAMETER. IT SHOULD BE REMEMBERED THAT AT LEAST ONE SLAVE NUMBER REQUEST

MUST BE ENTERED. IF THE FIRST
REQUEST IS RESPONDED TO BY A CARRIAGE
RETURN, THEN THE REQUEST WILL BE REPEATED.

DENSITY: THE DESITY REQUEST IS RESPONDED TO BY ONE (1) OCTAL
CHARACTER AND MUST BE WITHIN THE LIMITS OF 0 THRU 4.
AS EACH SLAVE NUMBER IS ENTERED, A REQUEST FOR THE
OPERATING DENSITY FOR THAT SLAVE IS TYPED. THE
RESPONSE MEANINGS ARE AS FOLLOWING:

A. 0 = 200BPI, NRZ1
B. 1 = 556BPI, NRZI
C. 2 = 800BPI, NRZI
D. 3 = 800BPI, NRZI
E. 4 = 1600BPI, PE (9 CHANNEL ONLY)

PARITY: THE PARITY REQUEST IS RESPONDED TO BY ONE (1)
OCTAL CHARACTER AND MUST BE EITHER 0 OR 1.

A. 1 = EVEN PARITY
B. 0 = ODD PARITY

FORMAT: THE FORMAT REQUEST IS RESPONDED
TO BY TWO (2) CHARACTERS
AND SHOULD BE AS FOLLOWS

A. 14 = 9 CHANNEL NORMAL (TWO FRAMES PER WORD)
B. 15 = CORE DUMP (FOUR FRAMES PER WORD)

RECORD COUNT: THIS REQUEST IS RESPONDED TO BY A SIX (6) CHARACTER
OCTAL NUMBER FROM 1 TO 177777. REMEMBER LEADING
ZEROS ARE NOT REQUIRED AND IF LESS THAN SIX
CHARACTERS ARE ENTERED, A CARRIAGE RETURN
WILL TERMINATE THE RESPONSE. THE RECORD COUNT
IS USED IN CONJUCTION WITH THE CHARACTER COUNT
TO ESTABLISH A BLOCKING FACTOR FOR USE IN READ OR
WRITE CYCLES.

CHARACTER COUNT: THIS RESPONSE IS ENTERED AS FOUR (4) OCTAL
CHARACTERS WITHIN THE LIMITS OF 20 THRU 4000. AGAIN
LEADING ZEROS ARE NOT REQUIRED AND A CARRIAGE
RETURN TERMINATES A LESS THAN FOUR (4) CHARACTER
RESPONSE. THE CHARACTER COUNT IN CONJUNCTION
WITH THE RECORD COUNT IS USED TO ESTABLISH
THE BLOCK SIZE (CHARACTERS PER RECORD, AND
RECORDS PER BLOCK) USED IN READ AND WRITE CYCLES
THE SAME BLOCKING IS USED ON ALL AVAILABLE UNITS.

PATTERN NUMBER: THIS RESPONSE IS A TWO (2) CHARACTER OCTAL
NUMBER WITHIN THE LIMITS OF 0 THRU 15(8).
THE NUMBER ENTERED WILL CAUSE A SPECIFIC DATA
PATTERN TO BE USED FOR ALL READING AND WRITING. THIS
DATA PATTERN IS NOT CHANGED UNLESS RANDOM DATA
IS REQUESTED BY SETTING CONSOLE SWITCH EIGHT (8)
TO A ONE. RESETTING OF THE RANDOM DATA SWITCH
DOES NOT CAUSE REVERSION TO THE FIXED PATTERN,
BUT WILL HOLD THE LAST GENERATED PATTERN UNTIL
A RESTART IS DONE FROM LOCATION 200(8), 210(8), OR 300(8).
WHEN OPERATING IN NRZ MODE (DENSITY 0-3)
THE PROGRAM CONSTRUCTS AND SAVES
BOTH AN EXPECTED CRC CHARACTER AND AN
LRC CHARACTER FOR COMPARISONS WITH
THE HARDWARE GENERATED CHECK CHARACTER
IN BOTH READ AND WRITE.
THE SELECTION OF DATA PATTERN ZERO (0) HAS A
SPECIAL USE. PATTERN NUMBER ZERO (0) WILL
CAUSE TO BE READ IN AT THE HIGH SPEED PAPER
TAPE READER ANY DATA PATTERN DESIRED.
THE EXTERNAL INPUT DATA THOUGH THE READER
IS DONE BY PREPARING A PAPER TAPE WITH A PROGRAM
CALLED DTC. (MAINDEC-11-DZTUF-A-D) ANY CONFIGURATION
OF BITS AND CHARACTERS MAY BE USED AND A LIMIT
OF 377(8) CHARATERS IS IMPOSED. WHEN EXTERNAL
DATA IS INPUT, THE ENTIRE WRITE BUFFER IN
CORE IS FILLED WITH THE PATTERN SO THAT ANY
SIZE RECORD MAY BE USED. DATA PATTERN
PATTERN ZERO (0) EXTERNAL PAPER TAPE NEED ONLY
BE READ ONCE AT INITIAL START OF 200(8), AND
NEED NOT BE READ AGAIN UNLESS OVERWRITTEN BY
RANDOM DATA. BE SURE TO LOAD THE READER
BEFORE PRESSING START.

TAPE MARK: THE TAPE MARK REQUEST IS USED TO DETERMINE
IF THE OPERATOR WISHES TO HAVE EACH
DATA BLOCK SEPERATED BY A TAPE MARK. IF
RESPONDED TO BY A ONE (1) THE TAPE MARK
WILL BE WRITTEN AND WHEN READING WILL
BE EXPECTED AT THE END OF DATA BLOCK.
A ZERO (0) RESPONSE WILL DISALLOW TAPE
MARK. PLEASE NOTE THAT THE TAPE MARK
RECORD INCREASES THE BLOCK SIZE BY ONE (1)
RECORD; IN OTHER WORDS, A BLOCK OF 100
RECORDS WILL HAVE THE TAPE MARK AS RECORD 101.

INTERCHANGE READ: THIS REQUEST IS RESPONDED TO BY
A SINGLE CHARACTER INPUT OF EITHER
ONE (1) OR ZERO (0). A RESPONSE OF ONE (1)
WILL CAUSE ALL READING TO BE DONE IN
THE INTERCHANGE MODE. A ZERO RESPONSE
WILL CAUSE READING IN NORMAL MODE.

SINGLE PASS: THIS REQUEST IS RESPONDED TO BY EITHER A ONE (1) OR A ZERO (0). RESPONSE OF 1, WILL CAUSE THE TEST TO BE STOPPED AFTER THE LAST AVAILABLE DRIVE REACHES END OF TAPE. A RESPONSE OF 0, WILL ALLOW CONTINUOUS RUNNING THROUGH MULTIPLE PASSES. TO RESTART AT END OF PASS, PRESS CONTINUE, OR RESTART AT THE CONSOLE.

STALLS: THE STALL REQUESTS ARE RESPONDED TO BY A SIX (6) CHARACTER OCTAL NUMBER WITHIN THE LIMITS OF 1 THRU 177777. LEADING ZEROS ARE NOT REQUIRED AND AN ENTRY OF LESS THAN SIX (6) CHARACTERS SHOULD BE TERMINATED BY A CARRIAGE RETURN. EACH INCREMENT OF THE VALUE ADDS ABOUT 2.6 MICSEC TO THE DELAY.

READ: THE TIME DELAY BETWEEN EACH RECORD READ

WRITE: THE TIME DELAY BETWEEN EACH RECORD WRITTEN

TURN AROUND: TIME DELAY BETWEEN CHANGES OF TAPE DIRECTION (FORWARD,TO REVERSE,ETC.) AND BETWEEN BLOCKS.

FIXED PARAMETERS: IT SHOULD BE NOTED THAT ALL PARAMTERS EXCEPT FOR THE SLAVE DESCRIPTION VALUES (SLAVE NUMBER, DENSITY, PARITY, AND FORMAT) HAVE NOMINAL VALUES ALREADY STORED IN THE PROGRAM.
AS EACH PARAMETER REQUEST (PATTERN NUMBER, RECORD COUNT, CHARACTER COUNT, TAPE MARK AND STALLS) IS TYPED.
ITS PRESENT STORED VALUE IS ALSO PRINTED.
IF THESE VALUES NEED NOT BE CHANGED, SIMPLY TYPE A CARRIAGE RETURN AS RESPONSE AND NO CHANGE WILL BE MADE. EACH START OF THE PROGRAM AT 200(8) WILL SHOW THE CURRENT VALUES OF THESE PARAMETERS AS PER THE LAST ENTRY. WHEN A FRESH LOAD OF THE PAPER TAPE IS DONE, THE PARAMETERS WILL REFLECT THE FIXED VALUES STORED IN THE PROGRAM.

A. RECORD COUNT = 100
B. CHARACTER COUNT = 200
C. PATTERN NUMBER = 1
D. TM=0
E. INTERCHANGE READ = 0
F. SINGLE PASS = 0
G. READ STALL = 1
H. WRITE STALL = 1
I. TURN AROUND STALL = 1

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SAMPLE START AT 200(8):

        THE FOLLOWING IS A SAMPLE OF THE
        PRINTED REQUESTS AND THEIR RESPONSES.
        RESPONSES ARE ENCLOSED IN PARENS FOR
        CLARITY ONLY AND (CR) MEANS CARRIAGE RETURN

LOAD ADDRESS 200(8), SET CONSOLE SWITCHES, PRESS START SWITCH:

        ***SWR=XXXXXX NEW= WILL BE TYPED FIRST IF THE SOFTWARE
           REGISTER IS SELECTED(REFER TO SECTION 8 FOR OPERATOR OPTIONS).
        TU16 TAPE DRIVE TEST
        ENTER CONDITIONS IN OCTAL

        REGISTER START=172440(172440)
        VECTOR ADDRESS=224(CR)
        DRIVE NUMBER (4)
        SLAVE NUMBER=(5) SN: 5009
        DENSITY=(3)
        PARITY=(0)
        FORMAT=(14)
        SLAVE NUMBER=(2) 7 CHAN SN: 0022
        DENSITY=(2)
        PARITY=(1)
        FORMAT=(15)
        SLAVE NUMBER=(CR)
        RECORD COUNT=100 (500)(CR)
        CHARACTER COUNT=200 (38)?(7)(CR)
        PATTERN NUMBER=1 (22)
        ?
        (6)(CR)
        TM=(0)
        INTERCHANGE READ=(1)
        SINGLE PASS=(0)

        ENTER STALLS
        READ=1 (CR)
        WRITE=1 (CR)
        TURN AROUND=1 (3000)(CR)

THE PROGRAM WILL NOW PERFORM THE TEST CYCLE SET IN
THE CONSOLE SWITCHES ON SLAVE FIVE (5) THEN TWO (2),
ONE BLOCK ON EACH UNIT PER CYCLE, USING DATA PATTERN
NUMBER SIX (6) WITH A BLOCKING FACTOR OF 37 CHARACTERS
PER RECORD AND 500 RECORDS PER BLOCK.  THE DELAYS ARE SET
FOR MINIMUM ON READ AND WRITE, AND APPROXIMATELY .75
SECONDS ON TURN AROUND.

NO TAPE MARKS WILL BE WRITTEN AND ALL READING
WILL BE DONE IN INTERCHANGE MODE (MAINT MODE 0001).
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4.1 AUTOMATIC MODE OPERATION

IF THE PROGRAM IS LOADED AND RUN IN AUTOMATIC (CHAIN) MODE THE AUTO ACCEPT SEQUENCE TEST PLAN IS RUN (SEE SEC 11); THE SOFTWARE SWITCH REGISTER IS INVOKED WITH A SWITCH SETTING OF 100000 (HALT ON ERROR SET). NO OPERATOR INTERVENTION IS REQUIRED.

** EXCEPTION: IF LOADED VIA TMDP CHAIN MODE THE PROGRAM WILL NOT TEST SLAVE 0 ON THE FIRST AVAILABLE DRIVE.

5. DATA PATTERNS

THERE ARE FIFTEEN DATA PATTERN GENERATORS STORED IN CORE AND ANY ONE OF THESE MAY BE SELECTED. THE ONE UNIQUE CASE IS PATTERN ZERO(0); SELECTION OF PATTERN ZERO(0) REQUIRES THAT A PREVIOUSLY PREPARED PAPER TAPE BE ENTERED AT THE HIGH SPEED READER. THIS TAPE CONTAINS A DATA PATTERN OF NO MORE THAN 377 OCTAL CHARACTERS. THE FIRST CHARACTER READ IN IS THE NUMBER OF ACTUAL DATA CHARACTERS THAT ARE CONTAINED ON THE TAPE. EACH DATA CHARACTER MAY BE ANY COMBINATION OF BITS AND WILL BE LOADED INTO CORE AS THEY APPEAR ON THE TAPE. NO MATTER HOW MANY CHARACTERS ARE ON TAPE, THE ENTIRE WRITE BUFFER (4000 CHARACTERS) WILL BE FILLED WITH THE PATTERN ENTERED SO THAT ANY SIZE RECORD CAN BE USED. (SEE DTC MAINDEC-11-DZTUF-A-D) THE PROGRAM GENERATES A CYLIC REDUNDENCY CHECK CHARACTER (CRC) AND A LONGITUDINAL REDUNDENCY CHECK CHARACTER (LRC) FOR COMPARISONS AGAINST THE CRC AND LRC GENERATED BY THE HARDWARE IN NRZI READS OR WRITES.

THE FOLLOWING IS A LIST OF THE DATA PATTERNS AVAILABLE:

DATA0: EXTERNAL INPUT THRU HIGH SPEED READER (SEE DTC)
DATA1: ALL ONE BITS IN ALL CHARACTERS
DATA2: ALL ZERO BITS IN ALL CHARACTERS
DATA3: A ONE BIT WALKING FROM RIGHT TO LEFT IN A FIELD OF ZEROS
DATA4: A ZERO BIT WALKING FROM RIGHT TO LEFT IN A FIELD OF ONES.
DATA5: ALTERNATING ONE AND ZERO BITS IN EACH CHARACTER
DATA6: ALTERNATING ZERO AND ONE BITS IN EACH CHARACTER
DATA7: SAME AS DATA5 BUT WITH EVERY OTHER CHARACTER COMPLEMENTED
DATA10: WALKING ONE/ALL ONE IN ALTERNATING CHARACTERS
DATA11: INCREMENTING CHARACTERS (000-377)
DATA12: DECREMENTING CHARACTERS (377-000)
DATA13: ALTERNATING CHARACTERS OF ALL ZERO AND ALL ONE BITS
DATA14: WALKING ZERO/ALL ZERO IN ALTERNATING CHARACTERS
DATA15: AUTO SEQUENCE PATTERN 0,0,-1,-1,-1,0,0

6. RANDOMIZATION

THERE ARE THREE (3) VALUES THAT MAY BE GENERATED RANDOMLY; DATA, CHARACTER COUNT, AND RECORD COUNT. THESE ARE NORMALLY SET TO SOME FIXED VALUE BUT MAY BE RANDOMIZED BY SETTING THE APPROIATE CONSOLE SWITCHES.

A. RANDOM DATA: (CONSOLE SWITCH 8)
GENERATES AN ENTIRE BUFFER, CHARACTER BY CHARACTER, OF RANDOM DATA WHEN SWITCH 8 IS SET TO A ONE. ONCE SET, THE RESETTING OF SWITCH 8 CAUSES THE LAST GENERATED PATTERN TO BE RETAINED IN CORE. A RESTART AT LOCATION 200(8) OR 210(8) WILL CAUSE REVERSION OF THE DATA TO THE FIXED PATTERN REQUESTED INITIALLY. A RESTART AT LOCATION 204(8) WILL HOLD THE LAST GENERATED PATTERN IN CORE UNTIL SWITCH 8 IS AGAIN SET.
ALTHOUGH THE DATA IS GENERATED AS RANDOM, THE PROGRESSION OF RANDOM CHARACTERS IS ALWAYS THE SAME FROM THE OUTSET OF RANDOMIZATION. THEREFORE IT IS POSSIBLE TO GENERATE ONE TAPE REEL OF RANDOM DATA ON ONE UNIT, RESTART THE PROGRAM TO RE-ESTABLISH THE OUTSET POINT, AND READ THE RANDOM TAPE REEL ON ANOTHER UNIT FOR COMPATABILITY TESTING. IN MULTIDRIVE SYSTEMS THE SAME BLOCK OF DATA, WHETHER RANDOM OR FIXED, IS WRITTEN OR READ ON EACH AVAILABLE UNIT IN THE ORDER THAT THEY WERE ENTERED, BEFORE BEING CHANGED.

B. RANDOM CHARACTER COUNT: (CONSOLE SWITCH 7)
GENERATES A DIFFERENT NUMBER OF CHARACTERS PER RECORD TO BE WRITTEN ON EACH BLOCK CYCLE. THE SAME NUMBER OF CHARACTERS PER RECORD IS WRITTEN OR READ ON EACH AVAILABLE UNIT BEFORE BEING CHANGED. RESETTING SWITCH 7 HOLDS THE LAST VALUE GENERATED.

C. RANDOM RECORD COUNT: (CONSOLE SWITCH 6)
GENERATES A DIFFERENT NUMBER OF RECORDS FOR EACH BLOCK OF DATA WRITTEN OR READ ON EACH BLOCK CYCLE. THE SAME NUMBER OF RECORDS IS WRITTEN OR READ ON EACH AVAILABLE UNIT BEFORE BEING CHANGED. RESETTING SWITCH 6 HOLDS LAST VALUE GENERATED.

7. DYNAMIC PARAMETERS:

THE THREE (3) STALL VALUES ARE CONSIDERED TO BE DYNAMIC PARAMETERS AS THEY MAY BE CHANGED WHILE THE PROGRAM IS RUNNING BY TYPING A CONTROL C CHARACTER AT THE TELETYPE. AS SOON AS THE BUS IS RELEASED BY THE MAG TAPE OPERATION IN PROGRESS, THE PROGRAM WILL RESPOND TO THE CONTROL C INPUT BY TYPING A REQUEST FOR NEW STALL PARAMETERS. THE LAST VALUES THAT WERE ENTERED WILL BE PRINTED AS THE STORED VALUES AND MAY BE CHANGED BY ENTERING NEW VALUES OR LEFT UNCHANGED BY TYPING A CARRIAGE RETURN.
THE YOZZLE STALL IS ALSO DYNAMIC AND CAN BE CHANGED BY TYPING A CNTRL C WHILE DOING A YOZZLE. A YOZZLE STALL REQUEST WILL BE PRINTED AND SHOULD BE RESPONDED TO WITH THE DESIRED VALUE.

8. CONSOLE SWITCH SETTINGS

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES, AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G <↑G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

   A) THIS PROGRAM WILL PROCESS THE <↑G> EITHER IN FLAG MODE OR INTERRUPT DEPENDING ON WHERE IN THE PROGRAM THE <↑G> IS EXCEPTED. THE PROGRAM WILL SERVICE THE INTERRUPT ONLY WHEN THE PRIORTY IS LOWERED TO ALLOW THE TTY TO INTERRUPT.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
   IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U <↑U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

THE CONSOLE SWITCHES ARE USED TO SET UP THE TEST CYCLE DESIRED, TO GENERATE RANDOM VALUES, AND TO CONTROL ERROR RESPONSES. THE SWITCHES SHOULD BE SET IN THE DESIRED MANNER BEFORE PRESSING THE START SWITCH BECAUSE THEY ARE ALL DYNAMIC AND WILL RUN THE PROGRAM IN ANY CONFIGURATION. ALL SWITCHES SET TO ZERO(0) IS NORMAL.

SW15: 1=STOP ON ERROR
(100000)0=CONTINUE ON ERROR

SW14: 1=PRINT READ/WRITE STATISTICS
(040000)0=DO NOT PRINT STATS

SW13: 1=DO NOT CHECK DATA ERRORS

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(020000)0=CHECK DATA ERRORS

SW12:   1=DO NOT CHECK WRITE STATUS ERRORS (NOR CLEAR THEM IF THEY DO OCCUR)
(010000)0=CHECK WRITE STATUS ERRORS

SW11:   1=DO NOT CHECK READ STATUS ERRORS (NOR CLEAR THEM IF THEY DO OCCUR)
(004000)0=CHECK READ STATUS ERRORS

SW10:   1=DO NOT PRINT ANY ERRORS (EXCEPT CATASTROPHIC ERRORS)
(020000)0=PRINT ALL ERRORS

SW9:    1=REWIND ALL AVAILABLE TAPES
(010000)0=DO NOT REWIND

SW8:    1=GENERATE RANDOM DATA
(004000)0=USED FIXED DATA

SW7:    1=GENERATE RANDOM CHARACTER COUNT
000200)0=USE FIXED CHARACTER COUNT

SW6:    1=GENERATE RANDOM RECORD COUNT
(000100)0=USED FIXED RECORD COUNT

SW5:    1=YOZZLE ON CURRENT RECORD
(000040)0=DO NOT YOZZLE ON RECORD

SW4:    1=DO WRITE/READ RETRIES
(000020)0=DO NOT RETRY

SW3:    1=DO NOT READ FORWARD
(000010)0=READ FORWARD

SW2:    1=DO NOT READ REVERSE
(000004)0=READ REVERSE

SW1:    1=READ FORWARD FIRST
(000002)0=READ REVERSE FIRST

SW0:    1=DO NOT WRITE
(000001)0=WRITE
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SWITCH EXPLANATION AND EXAMPLES:

SW0-3: THESE SWITCHES ARE USED TO CONTROL THE SEQUENCE OF MAG TAPE OPERATIONS PREFORMED ON EACH AVAILABLE UNIT. THE BLOCK OF DATA DESCRIBED THROUGH THE RESPONSES TO TELETYPE REQUESTS AT INITIAL START WILL BE EITHER WRITTEN OR READ FROM EACH AVAILABLE UNIT IN THE ORDER THAT THEY WERE ENTERED. THE SEQUENCE OF OPERATIONS IS CALLED A CYCLE, AND WILL BE PERFORMED CONTINUOUSLY UNTIL STOPPED BY THE OPERATOR. WHEN END OF TAPE IS REACHED, THE UNIT WILL BE REWOUND AND FLAGGED AS UNAVAILABLE FOR TEST UNTIL ALL UNITS HAVE REACH EOT, AT WHICH TIME TESTING IS RESUMED ON ALL AVAILABLE UNITS.

EXAMPLES: 0-3

A. SW0=0,SW1=0,SW2=1,SW3=1
WRITE ONLY X RECORDS OF Y CHARACTERS

B. SW0=0,SW1=0,SW2=1,SW3=0
WRITE THEN BACKSPACE AND READ FORWARD X RECORDS

C. SW0=0,SW1=0,SW2=0,SW3=1
WRITE THEN READ REVERSE X RECORDS.

D. SW0=0,SW1=0,SW2=0,SW3=0
WRITE THEN READ REVERSE AND READ FORWARD X RECORDS

E. SW0=0,SW1=1,SW2=0,SW3=0
WRITE THEN BACKSPACE AND READ FORWARD THEN REVERSE

F. SW0=1,SW1=0,SW2=1,SW3=0
READ TAPE FORWARD X RECORDS

G. SW0=1,SW1=0,SW2=0,SW3=1
READ TAPE REVERSE X RECORDS

H. SW0=1,SW1=0,SW2=0,SW3=0
READ TAPE REVERSE THEN FORWARD

I. SW0=1,SW1=1,SW2=0,SW3=0
READ TAPE FORWARD THEN REVERSE

SW4: SWITCH FOUR (4), WHEN SET TO A ONE (1), WILL
CAUSE ANY DATA RELATED ERROR TO BE RETRIED.
THE WRITE RETRY SCHEME CONSISTS OF REWRITING THE RECORD
IN THE SAME SPOT ON TAPE FOUR (4) TIMES. IF
ALL FOUR (4) REPEATS ARE SUCCESSFUL, THE
RECORD IS CONSIDERED AS RECOVERED, AND A TAPE
WRITE ERROR IS LOGGED. IF ANY OF THE FOUR
(4) REPEATS IS UNSUCESSFUL, A SKIP ERASE IS
DONE, A SUPECTED BAD TAPE SPOT IS LOGGED
AT THIS BLOCK AND RECORD NUMBER, AND A SECOND
RETRY OF FOUR REPEATS IS DONE. IF AFTER FOUR
(4) RETRIES, THE RECORD CANNOT BE RECOVERED
A NOTIFICATION IS PRINTED, AND TESTING IS
RESUMED ON THE NEXT RECORD.
IF 20(8) BAD TAPE SPOTS ARE FOUND, THE
SLAVE WILL BE REWOUND AND REMOVED FROM
TESTING WITH AN APPROPRIATE MESSAGE PRINTED.
THE READ RETRY SCHEME CONSISTS OF REREADING THE
RECORD UP TO EIGHT TIMES. IF ALL EIGHT REREADS ARE
BAD, IT IS A HARD ERROR. IF ANY REREAD IS
SUCCESSFUL, THIS IS A SOFT ERROR.
IF THE ORIGINAL ERROR IS OF THE NON-RETRYABLE
TYPE (IE: ILF,RMR,ILR,NEF,CBUSPE), THE RETRY SCHEME
IS NOT ENTERED AND A MESSAGE IS PRINTED.

SW5: SWITCH FIVE (5) WHEN SET DURING A READ
FORWARD OR REVERSE WILL CAUSE THE TAPE
TO CONTINUOUSLY READ THE CURRENT RECORD
BY SPACING EITHER FORWARD OR REVERSE AND
REREADING THAT RECORD. THIS TAPE MOVEMENT
IS CALLED YOZZLING. THERE IS A SOFTWARE
DELAY EXECUTED BETWEEN EACH SPACE/READ
OF THE RECORD AND IT MAY BE VARIED BY
TYPING CONTROL C ON THE TELETYPE DURING
THE EXECUTION OF THE YOZZLE AND RESPONDING
TO THE PRINTED REQUEST WITH A SIX (6)
DIGIT VALUE. THE YOZZLE STALL IS PRESET
TO A VALUE OF 3000 IN THE PROGRAM TO
PREVENT EXCESSIVE TAPE WEAR, BUT MAY BE
SET TO ANY VALUE THROUGH THE TELETYPE.

SW6-8: THESE THREE (3) SWITCHES CONTROL THE RANDOMIZATION
OF DATA AND BLOCK SIZE AND MAY BE SET
AND RESET AT ANY TIME. THE ACTUAL CHANGE
WILL TAKE PLACE BETWEEN BLOCK CYCLES.

SW9: SWITCH NINE (9) WHEN SET WILL CAUSE ALL
AVAILABLE TAPE UNITS TO BE REWOUND AT
THE END OF THE CURRENT BLOCK CYCLE. TESTING
WILL BE RESUMED AT A BLOCK COUNT OF
ONE (1) WHEN ALL UNITS HAVE REACHED BOT.

SW10-13: THESE SWITCHES ARE USED TO CONTROL THE ERROR HANDLING TO BE DONE ON THE TAPE OPERATION DESCRIBED BY SWITCHES 0-3.

A. SWITCH TEN (10) WHEN SET TO A ONE WILL DISALLOW ANY ERROR PRINTOUTS MADE ON THE OPERATION IN PROGRESS. CATASTROPHIC FAILURES AND INFORMATION PRINTOUTS WILL STILL OCCUR. IE: UNIT NOT AVAILABLE, ILLEGAL BOT, DROP OR PICK OVERFLOW, AND EOT REWIND.

B. SWITCH ELEVEN (11) WHEN SET TO A ONE WILL DISALLOW THE CHECKING FOR STATUS ERRORS ON READ (FORWARD OR REVERSE) OPERATIONS.

C. SWITCH TWELVE (12) WHEN SET TO A ONE WILL DISALLOW THE CHECKING FOR STATUS ERRORS ON WRITE OPERATIONS.

D. SWITCH THIRTEEN (13) WHEN SET TO A ONE WILL DISALLOW THE CHECKING OF READ DATA. THIS SWITCH HAS NO EFFECT ON STATUS CHECKING.

**NOTE THAT WHEN SW11 OR 12 ARE SET, NOT ONLY ARE ERRORS NOT CHECKED, BUT THEY ARE NOT CLEARED EITHER.
***THEREFOR USE CAUTION TO ASSURE THAT OPERATIONS ARE NOT UNEXECUTED DUE TO UNCLEARED ERRORS.
****DO NOT SET SW 11 OR 12 TO A ONE (1), DURING A RETRY SEQUENCE.

SW14: SWITCH FOURTEEN (14)WHEN SET TO A ONE (1) WILL PRINT THE ACCUMULATED READ/WRITE STATISTICS FOR THE SELECTED SLAVE UNDER TEST AT THE END OF THE CURRENT BLOCK CYCLE. THE STATISTICS PRINTED ARE THE NUMBER OF BITS DROPPED OR PICKED, THE NUMBER OF RETRIES, WRITE ERRORS, READ ERRORS, AND DATA ERRORS.

SW15: SWITCH FIFTEEN (15) WHEN SET TO A ONE, WILL CAUSE THE PROGRAM TO HALT ON ANY ERROR DETECTED BY THE OPERATION IN PROGRESS. IF BOTH SWITCH TEN (10) AND FIFTEEN (15) ARE SET, THE ACTUAL ERROR DETECTED WILL NOT BE PRINTED BUT WILL CAUSE A HALT. IF SWITCH TEN (10) IS RESET BEFORE PRESSING CONTINUE, THE ERROR WHICH CAUSED THE HALT WILL BE PRINTED BEFORE TESTING IS RESUMED.

*****PROGRAM HALTS*****

***IF THE SOFTWARE SWITCH REGISTER IS USED AND THE PROGRAM HALTS THEN THE OPERATOR CAN PRESS A <↑G> CONTROL G BEFORE HITTING CONTINUE. THIS WILL ALLOW THE OPERATOR TO ENTER DATA INTO THE SOFTWARE SWITCH REGISTER.

9. ERROR PRINTOUTS

THERE ARE THREE TYPES OF ERROR PRINTOUTS MADE BY THE PROGRAM; OPERATION ERRORS, DATA ERRORS, AND CONDITION ERRORS. EACH ERROR MESSAGE PRINTED IS PROCEEDED BY A TWO LINE HEADER WHICH CONTAINS THE DRIVE NUMBER, SLAVE NUMBER, DENSITY, PARITY, AND FORMAT ON THE FIRST LINE, AND THE BLOCK NUMBER, RECORD NUMBER, RECORD SIZE, AND ERROR TYPE ON THE SECOND.

A. OPERATION ERRORS:

THESE ARE ERRORS WHICH CAN OCCUR AS A DIRECT RESULT OF A TAPE OPERATION.

1. READ/WRITE STATUS ERRORS: THESE ARE DETECTED BY EITHER THE TM02 ITSELF OR BY THE MASSBUS CONTROLLER. ALL STATUS ERRORS WILL BE REPORTED.

2. TAPE POSITION ERRORS: THESE ARE INDICATED BY AN INCORRECT SPACE OR REWIND OPERATION IN WHICH TAPE POSITION BECOMES UNRELIABLE.

B. DATA ERRORS:

DATA ERRORS WILL OCCUR WHEN TAPE IS BEING READ AND THE DATA FROM TAPE DOES NOT MATCH THE EXPECTED DATA. WHEN READING IN THE REVERSE DIRECTION, THE RECORD NUMBERS WILL BE COUNTED DOWN FROM LAST TO FIRST. THE CHARACTER NUMBERS IN REVERSE READS WILL ALSO BE COUNTED DOWN IN ORDER TO REFLECT TAPE POSITION RATHER THAN THE ORDER TRANSFERRED.

BECAUSE DATA RECORDS CAN BE UP TO FOUR THOUSAND CHARACTERS LONG, AN ERROR CONDITION WHICH WILL CAUSE THE ENTIRE RECORD TO READ INCORRECTLY COULD CAUSE A VERY LENGTHY PRINTOUT. THEREFORE, A COUNTER OF SUCCESSIVE BAD CHARACTERS IS EMPLOYED. IF TEN (10) CHARACTERS IN SUCCESSION ARE BAD, A NOTIFICATION IS PRINTED (BAD RECORD) AND THE NEXT TWENTY FIVE (25) CHARACTERS ARE SKIPPED BEFORE CHECKING IS RESUMED. IF THE BAD RECORD CONDITION OCCURS THREE (3) TIMES IN ONE RECORD, THE REST OF THE RECORD IS SKIPPED, DOWN TO THE LAST TEN (10) CHARACTERS WHICH WILL BE CHECKED. THE SKIPPING AND RESUMPTION OF CHECKING WILL ONLY BE DONE ON RECORDS WHICH ARE LONG ENOUGH TO ALLOW IT.

C. CONDITION ERRORS: (CATASTROPHIC)

THESE PRINTOUTS REFLECT THE STATE OF THE TAPE SYSTEM
EITHER BEFORE OR AFTER AN OPERATION

1. EOT: WHEN EOT (END OF TAPE) IS ENCOUNTERED DURING
EITHER A READ OR WRITE, THE CYCLE IS COMPLETED
ON THE SHORTENED BLOCK AFTER WHICH THE SLAVE
WILL BE REWOUND AND FLAGGED AS UNAVAILABLE
FOR TESTING UNTIL ALL SLAVES HAVE REACHED EOT AND
ARE REWOUND. WHEN THE LAST AVAILABLE SLAVE
HAS REACHED EOT AND BEEN REWOUND TO BOT,
TESTING WILL BE RESUMED ON ALL SLAVES.

2. ILLEGAL BOT: WHEN A SLAVE ENCOUNTERS BOT DURING
A READ, WRITE, OR SPACE OPERATION, AN ERROR
IS PRINTED AND THE PROGRAM HALTED. THIS IS
A CATASTROPHIC ERROR. TESTING MAY BE RESUMED
BY PRESSING CONTINUE; BUT A RESTART IS
SUGGESTED.

3. NO INTERRUPT RETURNED: EACH TAPE OPERATION SHOULD BE
TERMINATED BY THE SETTING OF AN INTERRUPT IN
THE CPU. IF NO INTERRUPT IS RETURNED WITHIN
THE APPROPIATE TIME, AN ERROR IS PRINTED.

4. NO MEDIUM ON-LINE: BEFORE AN OPERATION IS ATTEMPTED,
THE TM02 IS CHECKED FOR MOL. IF IT IS NOT
SET, AN ERROR IS PRINTED, AND THE PROGRAM STOPPED.
TESTING MAY BE RESUMED BY PRESSING CONTINUE.

5. NO BOT ON REWIND: AS EACH SLAVE IS REWOUND A CHECK
IS MADE TO ASSURE THAT PROPER POSITION AT BOT
IS ESTABLISHED. IF BOT IS NOT SET UPON COMPLETION OF
A REWIND, AN ERROR IS PRINTED AND THE PROGRAM
WILL HALT. PRESS CONTINUE TO RESUME TESTING.

6. POSITION ERROR: IF POSITION IS LOST DURING A RETRY,
A MESSAGE IS PRINTED, THE TAPE REWOUND,
AND REMOVED FROM TESTING UNTIL ALL ARE
RESTARTED AT BLOCK ONE.

7. BAD TAPE OVERFLOW: IF 20(8) BAD TAPE SPOTS ARE FOUND,
A MESSAGE IS PRINTED, THE TAPE REWOUND,
AND REMOVED FROM TESTING UNITLL ARE
RESTARTED AT BLOCK ONE.

8. HARD READ ERROR: IF ANY HARD READ ERROR IS ENCOUNTERED
DURING A RETRY, A MESSAGE IS PRINTED
REGARDLESS OF THE SETTING OF SW10.

9. NON-RETRYABLE: IF ANY NON-RETRYABLE ERROR IS ENCOUNTERED, A
MESSAGE IS PRINTED REGARDLESS OF THE SETTING OF SW10.

D. EXAMPLES:

GLOSSARY:

BN = CURRENT BLOCK NUMBER
RN = CURRENT RECORD NUMBER
RS = RECORD SIZE, IN FRAMES
WE = WRITE STATUS ERROR
RE = READ STATUS ERROR
SE = SPACE ERROR
TM = TAPE MARK
F = FORWARD
R = REVERSE
CS1 = RH/TU16 CONTROL REGISTER
WC = RH WORD COUNT
BA = RH BUS ADDRESS
FC = TU16 FRAME COUNT
CS2 = RH CONTROLLER STATUS
DS = TU16 DRIVE STATUS
ER = TU16 ERROR REGISTER
AS = ATTENTION SUMMARY
CK = TU16 CHECK CHARACTER
DB = RH DATA BUFFER
MR = TU16 MAINTENENCE REGISTER
DT = TU16 DRIVE TYPE
SN = TU16 SERIAL NUMBER
TC = TU16 TEST CONTROL
*F = DATA FORMAT
*P = PARITY
*D = DENSITY
*PATRN = DATA PATTERN NUMBER (R = RANDOM)

EXAMPLE 1: IN THIS EXAMPLE SLAVE 1 ON TM02 0 WAS
OPERATING AT 1600 BPI IN ODD PARITY USING
THE NINE CHANNEL NORMAL DATA FORMAT. A
WRITE STATUS ERROR WAS DETECTED. THE BAD
STATUS INDICATES THAT AN UNCORRECTABLE DATA
ERROR (BIT 6 OF ER) AND A PE FORMAT ERROR
(BIT 7 OF ER) OCCURED DURING THE WRITE
OPERATION OF THE SIXTH (6) RECORD OF THE
FIFTY (50) RECORDS IN BLOCK (2). THE
SIZE OF THE RECORD WAS TWO HUNDRED (200)
FRAMES. THE CHECK CHARACTER REFLECTS THE BAD TRACK.

```
DRIVE NO. 0 *SLAVE NO. 1 *D 4 *P 0 *F 14 *PATRN 1
*BN 2 *RN 6-50 *RS = 200 *WE
CS1 144260
CS2 100
DS 150640
ER 300
WC 0
CK 4
```

EXAMPLE 2: IN THIS EXAMPLE SLAVE 3 ON TM02 1 WAS
OPERATING AT 800 BPI IN EVEN PARITY USING
THE NINE CHANNEL NORMAL DATA FORMAT. A
READ STATUS ERROR WAS DETECTED DURING
THE REVERSE READ OF THE TENTH (10)
RECORD OF THE 25 RECORDS IN THIS BLOCK (12).
THE SIZE OF THE RECORD IS TWENTY (20) FRAMES.
THE PRINTOUT INDICATES THE DETECTION OF A
VERTICAL PARITY ERROR (VPE: BIT 6 OF ER) AND A
CYCLIC REDUNDENCY ERROR (CRC: BIT 15 OF ER).
THE CRC CHARACTER, AS RECEIVED, IS NOT
AS EXPECTED AND IS PRINTED SHOWING BOTH
THE ACTUAL (FIRST) AND THE EXPECTED (LAST).

```
DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 3
*BN 12 *RN 10-25 *RS 20 *RE R
CS1 144276
CS2 100
DS 150600
ER 100100
WC 0
CRC 767-777
```

EXAMPLE 3: IN THIS EXAMPLE, THE HEADER IS THE SAME AS
IN EXAMPLE TWO (2) EXCEPT THAT THE ERROR TYPE
REFLECTS A READ ERROR IN THE FORWARD
DIRECTION. IT IS NORMAL FOR THE SYSTEM
TO DETECT AN ERROR IN THE FORWARD AND
REVERSE DIRECTION AT THE SAME RECORD.
REMEMBER THAT IN REVERSE OPERATIONS THE
RECORD NUMBER IS COUNTED DOWN SO THAT
RECORD NUMBER TEN (10) WILL SHOWN IN
THE PROPER POSITION IN BOTH FORWARD AND
REVERSE.

```
DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 2
*BN 12 *RN 10-25 *RS 20 *RE F
CS1 144270
CS2 100
DS 150600
ER 100100
WC 0
CRC 767-777
```

EXAMPLE 4: IN EXAMPLES 2 AND 3 THE READ OPERATION
RESULTED IN BAD STATUS, HOWEVER THE
DATA ASSOCIATED WITH THE OPERATION WAS
NOT BAD (OR WAS NOT CHECKED: SW 13=1).
THIS EXAMPLE (4) SHOWS A PRINTOUT REFLECTING
A READ STATUS ERROR ACCOMPANIED BY BAD
DATA IN CHARACTERS FOUR (4) AND SIX (6).

```
DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 1 *F 14 *PATRN 2
*BN 12 *RN 10-25 *RS 20 *RE F
CS1 144270
CS2 100
DS 150600
ER 100100
WC 0
CRC 767-777
CN 4
G 11111111
B 10111111
CN 6
G 11111111
B 10111111
```

```
EXAMPLE 5: THIS EXAMPLE SHOWS A READ DATA ERROR
        WHICH OCCURRED, WITHOUT AN ACCOMPANING
        STATUS ERROR, WHICH RESULTED IN A BAD RECORD.

        DRIVE NO. 3 *SLAVE NO. 1 *D 4 *P 0*F 14 *PATRN R
        *BN 100 *RN 66-200 *RS 2000 *DE F
        CN 0
        G 11111111
        B 00000000
        CN 1
        G 11111111
        B 00000000
        CN 2
        G 11111111
        B 00000000
        CN 3
        G 11111111
        B 00000000
        CN 4
        G 11111111
        B 00000000
        CN 5
        G 11111111
        B 00000000
        CN 6
        G 11111111
        B 00000000
        CN 7
        G 11111111
        B 00000000
                BAD RECORD

EXAMPLE 6: THE FOLLOWING EXAMPLE SHOWS THE
        RESULT OF A SPACE OPERATION THAT
        SHOULD HAVE SPACED REVERSE OVER
        AN ENTIRE 100 RECORD BLOCK BUT
        WHICH TERMINATED AT THE END OF 40
        RECORDS.  LEAVING A POSITION ERROR OF 40

        DRIVE NO. 2 *SLAVE NO. 6 *D 2 *P 0 *F 14
        *BN 3 *RN 100-100 *RS 1000 *SE R
        ERR AMT 40
```

EXAMPLE 7: THIS EXAMPLE REFLECTS AN ERROR DETECTED
WHILE WRITING A TAPE MARK (TM) AT THE END
OF THE CURRENT DATA BLOCK PER OPTION RESPONSE
TM=1. NOTE THAT THE TM RECORD NUMBER
IS ONE GREATER THAN THE TOTAL NUMBER OF DATA
RECORDS IN THE CURRENT BLOCK.

```
DRIVE NO. 1 *SLAVE NO. 1 *D 2 *P 0 *F 14
*BN 67 *RN 101-100 *RS 36 *WE TM
CS1 144226
CS2 300
DS 150604
ER 1000
WC 0
```

EXAMPLE 8: THIS EXAMPLE SHOWS TWO (2) PRINTOUTS
REFLECTING A WRITE RETRY WHICH WAS NOT
SUCCESSFUL THE FIRST TIME, BUT WHICH
DID RECOVER ON THE SECOND.
THE UNSUCCESSFUL RETRY IS LOGGED AS
A SUSPECTED BAD TAPE SPOT BY ITS
BLOCK AND RECORD NUMBER.

```
DRIVE NO. 0 *SLAVE NO. 2 *D 4 *P 0 *F 14 *PATRN 6
*BN 2 *RN 12-20 *RS 667 *WE
CS1 144260
CS2 100
DS 150640
ER 100
WC 0
***ORIGINAL ERROR***

DRIVE NO. 0 SLAVE NO. 2 *D 4 *P 0 *F 14 *PATRN 6
*BN 2 *RN 12-20 *RS 667 *WE
CS1 144260
CS2 100
DS 150640
ER 100
WC 0
SUSPECT BAD TAPE
RETRY: 0
REPT: 0
RECOVERED
RETRY: 1
```

```
EXAMPLE 9: IF , DURING A WRITE RETRY THE BACKSPACE
        OR THE ERASE OPERATION RESULT IN AN ERROR,
        THE ERROR WILL BE PRINTED AND THE PROGRAM
        HALTED.  THIS EXAMPLE SHOWS THE ERROR PRINT
        FOR A SPACE AND AN ERASE (2 EXAMPLES)

        DRIVE NO. 1 *SLAVE NO. 1 *D 3 *P 0 *F 14
        BN 12 *RN 8-64 *RS 500 *SE RTRY
        ERR AMT 1

        DRIVE NO. 1 *SLAVE NO. 1 *D 3 *P 0 *F 14
        *BN 12 *RN 8-64 *RS 500 *ERASE
        CS1 144224
        CS2 100
        DS 150600
        ER 400
        WC 0

EXAMPLE 10: THIS EXAMPLE SHOWS THE PRINTOUT FROM
        A REWIND OPERATION WHICH DOES NOT HAVE
        BOT SET AT THE END.

        DRIVE NO. 2 *SLAVE NO. 3 *D 3 *P 0 *F 14
        *BN 66 *RN 15-20 *RS 1000
        NOT BOT ON REWIND: HALT

EXAMPLE 11: THIS EXAMPLE SHOWS THE PRINTOUT MADE WHEN
        THERE IS NO INTERRUPT RETURNED AT THE END
        OF AN OPERATION.

        DRIVE NO. 7 *SLAVE NO. 7 *D 2 *P 1 *F 14
        *BN 1 *RN 25-26 *RS 1200
        NO INTERRUPT
```

10. STATISTICS PRINTOUT

THE PROGRAM, THROUGH ITS ERROR CHECKING, IS ABLE TO GATHER CERTAIN
STATISTICS ABOUT THE PERFORMANCE OF EACH UNIT UNDER TEST.
THIS INFORMATION IS PRINTED OUT WHENEVER A UNIT IS REWOUND
FROM END OF TAPE, OR BECAUSE IT IS TO BE REMOVED FROM TESTING
DUE TO SOME CATASTROPHIC ERROR. (POSITION LOST, BAD TAPE OVERFLOW)
THE STATISTICS MAY BE PRINTED AT ANY TIME BY SETTING
SWITCH 14 TO A ONE (1). THIS PRESENTS A PICTURE OF PERFORMANCE
UP TO THIS TIME. THE STATISTICS WILL BE CLEARED UPON REWIND OF THE
UNIT; BUT NOT BY SETTING SW 14.

STATISTICS PRINT EXAMPLE (A HEADER WILL PRECEED THE STATS)

```
DROPS: 0 3 0 0 0 6 45 0
PICKS: 1 0 0 0 0 0 0 2
RETRY: 1
WTERR: 2
REFWD: 3
 SOFT: 2
 HARD: 1
DEFWD: 0
REREV: 4
 SOFT: 1
 HARD: 3
DEREV: 0
2 BAD TAPE SPOTS
0 *BN 1 *RN 2
1 *BN 15 *RN 100
```

** NOTE ** DROPS AND PICKS REFLECT CORE BIT POSITIONS.
THE FOLLOWING IS A TABLE OF CORE BITS TO TRACK NUMBER.

```
TRACK NO. 7 6 5 3 9 1 8 2
CORE BIT  7 6 5 4 3 2 1 0
```

```
DROPS: NUMBER OF DATA BITS DROPPED: PER CORE BIT(SEE NOTE ABOVE)
PICKS: NUMBER OF DATA BITS PICKED UP: PER CORE BIT(SEE NOTE ABOVE)
RETRY: NUMBER OF WRITE RETRIES
WTERR: NUMBER OF WRITE ERRORS NOT ASSOCIATED WITH BAD TAPE
REFWD: NUMBER OF READ FORWARD STATUS ERRORS
REREV: NUMBER OF READ REVERSE STATUS ERRORS
 SOFT: NUMBER OF RECOVERED READ ERRORS
 HARD: NUMBER OF UNRECOVERED READ ERRORS
DEFWD: NUMBER OF FORWARD DATA ERRORS WITH NO ASSOCIATED STATUS ERROR
DEREV: NUMBER OF REVERSE DATA ERRORS WITH NO ASSOCIATED STATUS ERROR
```

11. AUTO SEQUENCE

THE AUTO SEQUENCE (START AT ADDRESS 240) WILL EXECUTE A PREDETERMINED TEST PLAN ON ALL AVAILABLE SLAVES ON EACH AVAILABLE TM02. THE ONLY OPERATOR RESPONSE IS TO THE TYPED REQUESTS FOR THE RH ADDRESS, VECTOR, CONTINUOUS OR SINGLE CYCLE, AND NRZ ONLY. ALL SWITCHES REMAIN ACTIVE AND MAY BE USED NORMALLY; HOWEVER THE IDEA IS TO LEAVE ALL SWITCHES DOWN AND ALLOW FULL EXECUTION OF THE TEST PLAN FOR SYSTEM CHECKOUT.

SAMPLE START AT 240(8): AUTO SEQUENCE.

LOAD ADDRESS 240(8), SET SWITCHES TO ZERO, PRESS START:

```
        TU16 AUTO SEQUENCE TEST
        ENTER CONDITIONS IN OCTAL

        REGISTER START = 172400(172440)
        VECTOR ADDRESS = 224(CR)
        NRZ ONLY: (0)
        AUTO CONT: (1)
```

THIS EXAMPLE SHOWS AN AUTO SEQUENCE START WITH THE RH AT BUS ADDRESS 172440 AND A VECTOR OF 224. ALL AVAILABLE HARDWARE WILL BE TESTED CONTINUOUSLY IN BOTH NRZ AND PE MODE.

AS EACH TM02 AND ITS SLAVES ARE FOUND, A DIVIDER LINE OF ASTERICKS WILL BE PRINTED FOLLOWED BY A PRINTOUT OF THE TM02 AND ITS SLAVES BEING TESTED. AS EACH TM02 AND ITS SLAVES ARE FINISHED, ANOTHER DIVIDER IS PRINTED BEFORE TESTING IS RESUMED ON THE NEXT AVAILABLE DRIVE.

WHEN ALL AVAILABLE HARDWARE HAS BEEN TESTED, A PRINTOUT OF END OF SEQUENCE WILL BE DONE AND THE PROGRAM WILL EITHER HALT (AUTO CONT = 1) OR RESTART WITH THE FIRST AVAILABLE UNIT (AUTO CONT = 0).

AUTO SEQUENCE TEST PLAN:

THE AUTO SEQUENCE WILL EXECUTE BOTH AN NRZ AND A PE CYCLE. EACH CYCLE WILL BE STARTED FROM BOT AND CONSIST OF VARIOUS DATA PATTERNS INTENDED TO BE WORST CASE FOR THAT PARTICULAR MODE.

1. NRZ CYCLE:

SIX (6) BLOCKS OF ONE HUNDRED (100) RECORDS OF FOUR THOUSAND (4000) CHARACTERS FOR EACH OF THE FOUR DATA PATTERNS.

PATTERN 1:	ALL ONES DATA IN ALL BYTES
PATTERN 10:	WALKING ONE/ALL ONE
PATTERN 14:	WALKING ZERO/ALL ZERO
RANDOM DATA:	RANDOM

2. PE CYCLE: (IF NRZ ONLY = 0)

SIX BLOCKS OF ONE HUNDRED (100) RECORDS OF FOUR THOUSAND (4000) CHARACTERS EACH FOR EACH OF THREE DATA PATTERNS, THEN RANDOM DATA BLOCKS TO END OF TAPE.

PATTERN 10:	WALKING ONE/ALL ONE
PATTERN 14:	WALKING ZERO/ALL ZERO
PATTERN 15:	THREE (3) 0 CHARACTERS, TWO (2) ALL CHARACTERS, THREE 0 CHARACTERS, THEN COMPLIMENT PATTERN. REPEATED FOR A FULL BUFFER
RANDOM DATA:	RANDOM

12. TESTING PROCEDURES

AS PREVIOUSLY STATED THIS PROGRAM CONTAINS NO FIXED TESTS. THE ENTIRE TEST CYCLE TO BE EXECUTED IS DESCRIBED BY THE OPERATOR THOUGH RESPONSES TO TELETYPE REQUESTS FOR PARAMETERS AND CONSOLE SWITCH SETTINGS FOR OPERATION. THE OPERATION SELECTED WILL BE EXECUTED WITH THE PARAMETERS ENTERED CONTINUOUSLY ON EACH AVAILABLE UNIT, ONE BLOCK AT A TIME, UNTIL STOPPED BY THE OPERATOR. THE OPERATION MAY BE CHANGED DYNAMICALLY BY CHANGING THE CONSOLE SWITCHES AT ANY TIME. THE PROGRAM WILL ATTEMPT TO PERFORM ANY OPERATION SET AND THEREFORE CAUTION SHOULD BE TAKEN TO ASSURE THAT THE UNIT IS CAPABLE OF PERFORMING AS REQUESTED. FOR INSTANCE, ONE SHOULD NOT ATTEMPT TO PERFORM READ OPERATIONS ON A TAPE WHICH HAS NOT BEEN WRITTEN AS THE DATA, IF ANY, IS UNPREDICTABLE. HOWEVER, IF A TAPE HAS BEEN WRITTEN WITH THIS PROGRAM, IT CAN BE READ AS OFTEN AS DESIRED WITHOUT BEING REWRITTEN. THIS IS A GOOD PROCEDURE TO USE FOR TESTING TAPE COMPATABILITY. SCOPING OF TAPE UNITS BECOMES SIMPLE; BY SETTING THE DESIRED OPERATION AND ITS PARAMETER, A UNIT MAY BE CONTINUOUSLY EXERCISED IN ANY MANNER DESIRED. BY USING THE VARIOUS ERROR CONTROL SWITCHES AND ENTERING THE NEEDED STALL, ANY FUNCTION CAN BE SCOPED RATHER EASILY. RELIABILITY TESTING CAN BE PREFORMED BY USE OF THE RANDOMIZATION CAPABILITY. PERHAPS A CYCLE OF RANDOM TESTING MIGHT BE SET UP AND ALLOWED TO RUN FOR SOME PERIOD OF TIME, THE STATISTICAL COLLECTION OF DROPS AND PICKS IS THEN SIGNIFICANT. INTERMITTANT PROBLEMS CAN BE FOUND BY SETTING THE DESIRED OPERATION IN MOTION AND DISALLOWING ERROR PRINTOUTS WHILE ALLOWING A HALT ON ERROR. THE ERROR THAT CAUSED THE HALT CAN BE PRINTED BY RESETTING CONSOLE SWITCH TEN AND PRESSING CONTINUE. IF SOME PARTICULAR DATA PATTERN SHOULD BE CAUSING DATA ERROR, USE OF THE YOZZLE SWITCH AND ITS ASSOCIATED STALL WILL TO ALLOW SCOPING OF THIS PARTICULAR RECORD.

AS YOU SEE, THERE ARE MYRIAD TESTING PROCEDURES WHICH COULD BE PERFORMED. THE PARAMETERS, TAPE OPERATIONS, ERROR EXAMINATION AND REPORTING ARE ALL AT YOUR DISCRETION.

TRY IT, YOU'LL LIKE IT.

13. LISTING

```
                        .LIST   BIN,LOC,SEQ
                        .TITLE CZTUAJO TM02-TU16/TE16 RELIAB
                        ;ZZ - CZTUAJO
                        ;21 APRIL 76
                        ;R. BARNES

                        ;REVISED (++G) J.G.ADAMS MAY 1977       1)INTERMITTENT PGM FAILURE
                        ;++G                                    ON BAD TAPE OVERFLOW
                        ;++G                                    2)TAPE RUNAWAY AT EOT
                        ;++G                                    3)ERRONEOUS ERROR TYPEOUT
                        ;++G                                    4)CHANGED MISC INST'S TO
                        ;++G                                    CONSERVE MEMORY USAGE.
                        ;++G                                    5)ADDED ACT11 HOOKS
                        ;++G                                    6)FIXED TTY INPUT

                        ;REVISED (+JH) J. HITT MAY 1984         ADDED XON/XOFF FUNCTIONALITY
                        ;                                       FOR REMOTE DIAGNOSIS

                        .MCALL  .$ACT11,.$EOP,$CHAIN    ;++G ACT11 HOOKS
                        .NLIST  MC              ;++G DO NOT LIST MACRO CALLS
                        .LIST   ME              ;++G LIST MACRO EXPANSIONS
                        .ENABLE ABS,AMA         ;++G ENABLE ABS AND MODE '37'


                        ;CONSOLE SWITCHES************

                        ;SW15: 1=STOP ON ERROR
                        ;       0=CONTINUE ON ERROR

                        ;SW14: 1=PRINT READ/WRITE STATS
                        ;       0=DO NOT PRINT STATS

                        ;SW13: 1=DO NOT CHECK DATA
                        ;       0=CHECK DATA
                        ;SW12: 1=DO NOT CHECK WRITE ERRORS
                        ;       0=CHECK WRITE ERRORS
                        ;SW11: 1=DO NOT CHECK READ ERRORS
                        ;       0=CHECK READ ERRORS
                        ;SW10: 1=DO NOT PRINT ERRORS
                        ;       0=PRINT ERRORS

                        ;SW9:  1=REWIND TAPE
                        ;       0=DO NOT REWIND

                        ;SW8:  1=USE RANDOM DATA
                        ;       0=USE FIXED DATA PATTERN
                        ;SW7:  1=USE RANDOM CHARACTER COUNT
                        ;       0=USE FIXED CHAR COUNT
                        ;SW6:  1=USE RANDOM RECORD COUNT
                        ;       0=USE FIXED RECORD COUNT

                        ;SW5:  1=YOZZLE ON CURRENT RECORD
                        ;       0=DO NOT YOZZLE

                        ;SW4:  1=DO BOTH READ AND WRITE RETRIES
```

F3


```
1398                                    ;       0=INHIBIT RETRIES
1399
1400                                    ;SW3:   1=DO NOT READ FORWARD
1401                                    ;       0=READ FORWARD
1402                                    ;SW2:   1=DO NOT READ REVERSE
1403                                    ;       0=READ REVERSE
1404                                    ;SW1:   1=READ FORWARD FIRST
1405                                    ;       0=READ REVERSE FIRST
1406                                    ;SW0:   1=DO NOT WRITE
1407                                    ;       0=WRITE
```

```
                        ;TU16/TE16 REGISTER BITS**********

                        ;15 ;14 ;13 ;12 ;11 ;10 ;09 ;08 ;07 ;06 ;05 ;04 ;03 ;02 ;01 ;00 ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;CS1:                   ;SC ;TRE;MCP;SPR;DNA;PSL;A17;A16;RDY;IE ;FUN;FUN;FUN;FUN;FUN;GO ;
                        ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;WC:                    ; WORD                                                         ;
                        ; COUNT                                                        ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;BA:                    ; BUS                                                          ;
                        ; ADDRESS                                                      ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;FC:                    ; FRAME                                                        ;
                        ; COUNT                                                        ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;CS2:                   ;DLT;WCE;UPE;NED;NEM;PGE;MXF;MDP;OR ;IR ;CLR;PAT;BAI;U2 ;U1 ;U0 ;
                        ;   ;   ;   ;   ;   ;   ;   ;   ;ERR;   ;   ;   ;   ;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;DS:                    ;ATA;ERR;PIP;MOL;WRL;EOT;SPR;DPR;DRY;SSC;PES;SDN;IDB;EOF;BOT;SLA;
                        ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;ER:                    ;CDE;UNS;OPI;DTE;NEF;CS ;FCE;NSG;PEF;INC;DAT;FMT;CNT;RMR;ILR;ILF;
                        ;CRC;   ;   ;   ;ITM;   ;   ;LRC;VPE;BPE;   ;BPE;   ;   ;   ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;ATS:                   ; ATTENTION                                                    ;
                        ; SUMMARY                                                      ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;CC:                    ; CHECK                                                        ;
                        ; CHARACTER                                                    ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;DB:                    ; DATA                                                         ;
                        ; BUFFER                                                       ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;MR:                    ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;DB ;WRT;MM ;OP ;OP ;OP ;MM ;
                        ; 7 ; 6 ; 5 ; 4 ; 3 ; 2 ; 1 ; 0 ; P ;CLK;CLK; 4 ; 3 ; 2 ; 1 ;GO ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;DT:                    ; DRIVE     ; 7 ;   ;SLV;                                    ;
                        ; TYPE      ;CH ;   ;PR ;                                    ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;SN:                    ; SERIAL                                                       ;
                        ; NUMBER                                                       ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
;TC:                    ;ACL;FCS;TCW;ENA;SPR;DEN;DEN;DEN;FMT;FMT;FMT;FMT;EVN;SSN;SSN;SSN;
                        ;   ;   ;   ;DT ;   ; 4 ; 2 ; 1 ; 8 ; 4 ; 2 ; 1 ;PAR; 4 ; 2 ; 1 ;
                        ;XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```

```
                                        ;REGISTER EQUIVS************

                    000000              R0=%0
                    000001              R1=%1
                    000002              R2=%2
                    000003              R3=%3
                    000004              R4=%4
                    000005              R5=%5
                    000006              SP=%6
                    000007              PC=%7
                    000240              NOP=240

                                        ;TRAP CATCHERS***********
                    000030              .=30
000030  025016                          TRAP30
                    000032              .=32
000032  000340                          340


                                  ;ACT11 HOOK ***********
                    000034              $SVPC=.                 ;SAVE CURRENT LOCATION CTR
                    000046              .=46
000046  005120                          .WORD   $ENDAD          ;SET LOCATION 46
                    000052              .=52
000052  000000                          .WORD   0               ;SET LOCATION 52 = 0
                    000034              .=$SVPC                 ;RESTORE LOCATION CTR


                                        ;TTY INTERRUPT VECTOR**********
                    000060              .=60
000060  021632                          TTINT                   ;TTY INTERRUPT HANDLER ADDRESS
000062  000000                          0


                                        ;SOFTWARE SWITCH REGISTER LOC. 176**********

                    000176              .=176
000176  000000                          SWREG:  0               ;SOFTWARE SWITCH REGISTER

                                        ;START ADDRESS**********

                    000200              .=200
000200  000137  003030                  JMP     START           ;ENTER PARAMETERS VIA TTY

                    000204              .=204
000204  000137  003154                  JMP     STARTC          ;USE FIXED PARAMETERS; HOLD DATA

                    000210              .=210
000210  005037  015152                  CLR     RDFL
000214  000137  003162                  JMP     STARTA          ;USE FIXED PARAMETERS; NEW DATA

                                        ;MAG TAPE INTERRUPT VECTOR**********

                    000224              .=224
000224  021750                          MTINT                   ;MAG TAPE INTERRUPT HANDLER ADDRESS
000226  000340                          340
```

```
1510
1511                                    ;AUTO SEQUENCE START**********
1512
1513            000240                  .=240
1514  000240    005237  000734          INC     ASEQF           ;SET AUTO SEQUENCE FLAG
1515  000244    000137  003140          JMP     STAUT           ;GO TO START OF AUTO SEQUENCE
```

```
1516                                    ;SHORT CONVERSATION RESTART********
1517
1518            000300                  .=300
1519    000300  005237  014152          INC     SCVFL                   ;SET SHORT CONVERSATION FLAG
1520    000304  000137  003030          JMP     START                   ;ENTER SHORT PARAMETER LIST
1521
1522            000510                  .=510
1523                                    ;TU16/TE16 REGISTER EQUIVS**********
1524
1525    000510  172440          C1:    172440
1526    000512  172442          WC:    172442
1527    000514  172444          BA:    172444
1528    000516  172446          FC:    172446
1529    000520  172450          CS:    172450
1530    000522  172452          DS:    172452
1531    000524  172454          ER:    172454
1532    000526  172456          AS:    172456
1533    000530  172460          CC:    172460
1534    000532  172462          DB:    172462
1535    000534  172464          MR:    172464
1536    000536  172466          DT:    172466
1537    000540  172470          SN:    172470
1538    000542  172472          C2:    172472
1539
1540                                    ;CONSTANTS**********
1541
1542    000544  172440          REGS:  172440          ;STARTING REGISTER ADDRESS (CS1)
1543    000546  000224          VECT:  224             ;VECTOR ADDRESS (RH INTERRUPT)
1544    000550  000000          DVN:   0               ;DRIVE NUMBER
1545    000552  000000          UDES:  0               ;UNIT DESCRIPTION (PARITY,DENSITY,UNIT,FORMAT)
1546    000554  000100          RCNT:  100             ;RECORD COUNTER
1547    000556  177600          FMCNT: 177600          ;NUMBER OF CHAR (4 - 4000) OCTAL IN TWOS COMPLEMENT
1548    000560  000001          PATRN: 1               ;DATA PATTERN SELECTOR (0 - 15) OCTAL
1549    000562  000002          RDCMD: 2               ;READ COMMAND
1550    000564  000000          TMEX:  0               ;TAPE MARK FLAG: 1=TM 0=NO TM
1551    000566  000000          INTRF: 0               ;INTERCHANGE READ 1=YES 0=NO
1552    000570  000000          SPFLG: 0               ;SINGLE PASS 1=YES 0=NO
1553    000572  000001          RSTAL: 1               ;READ STALL
1554    000574  000001          WSTAL: 1               ;WRITE STALL
1555    000576  000001          TSTAL: 1               ;TURN AROUND STAL
1556    000600  002000          YSTAL: 2000            ;YOZZLE STAL
1557    000602  000010          RETRY: 10              ;READ RETRY NUMBER
1558    000604  177776          PSW:   177776          ;PROCESSOR STATUS
1559    000606  177570          SWR:   177570          ;CONSOLE SWITCHES
1560    000610  177560          TKS:   177560          ;TTY READ STATUS REGISTER
1561    000612  177562          TKB:   177562          ;TTY READ BUFFER
1562    000614  177564          TPS:   177564          ;TTY PUNCH STATUS REGISTER
1563    000616  177566          TPB:   177566          ;TTY PUNCH OUTPUT REGISTER
1564    000620  177550          PRS:   177550          ;H/S READER STATUS REGISTER
1565    000622  177552          PRB:   177552          ;H/S READER BUFFER
1566    000624  153624          RANBAS: 153624         ;RANDOM NUMBER GENERATOR BASE
1567    000626  032561          RANSAV: 032561         ;RANDOM NUMBER BUFFER
1568    000630  000000          RCSAV: 0               ;RECORD COUNT SAVE
1569    000632  000000          FCSAV: 0               ;FRAME COUNT SAVE
```

```
1570
1571                                    ;FLAGS AND COUNTERS**********
1572
1573  000634  000000    TINF:   0       ;TTY ENTERY FLAG
1574  000636  000000    TOB:    0       ;TTY OUTPUT BUFFER
1575  000640  000000    TIB:    0       ;TTY INPUT BUFFER
1576  000642  000000    TEMP1:  0       ;TEMP STORAGE
1577  000644  000000    TEMP2:  0       ;TEMP STORAGE
1578  000646  000000    TEMP3:  0       ;TEMP STORAGE
1579  000650  000000    NRZOF:  0       ;NRZ ONLY FLAG
1580  000652  000000    EMADDR: 0       ;ERROR MSG ADDRESS STORAGE
1581  000654  000000    BLCNTR: 0       ;BLOCK COUNTER
1582  000656  000000    BBC:    0       ;BAD RECORD COUNTER
1583  000660  000000    EOTREC: 0       ;EOT FLAG
1584  000662  000000    RTRN:   0       ;INTERRUUPT RETURN STORAGE
1585  000664  000000    HDRFL:  0       ;HEADER FLAG
1586  000666  000000    STAL:   0       ;DELAY STORAGE
1587  000670  000000    PFLG:   0       ;PRINT FLAG
1588  000672  000000    MTC1:   0       ;MAG TAPE CONT REGISTER BUFFER
1589  000674  000000    UNP:    0       ;UNIT TABLE POINTER
1590  000676  000000    TMFLG:  0       ;TAPE MARK FLAG
1591  000700  000000    RPCNT:  0       ;REPEAT COUNTER
1592  000702  000000    RTCNT:  0       ;RETRY COUNTER
1593  000704  000000    DERFL:  0       ;DATA ERROR FLAG
1594  000706  000000    SERFL:  0       ;STATUS ERROR FLAG
1595  000710  000000    BCNT:   0       ;BIT COUNTER
1596  000712  000000    RTYFL:  0       ;RETRY FLAG
1597  000714  000000    UPS:    0       ;UNIT POINTER SAVE
1598  000716  000000    BDPP:   0       ;BITS DROPPED POINTER
1599  000720  000000    BPKP:   0       ;BITS PICKED POINTER
1600  000722  000000    ERSAV:  0       ;ERROR SAVE LOC
1601  000724  000000    BTFLG:  0       ;BAD TAPE FLAG
1602  000726  000000    BTSTF:  0       ;STATISTIC PRINT FLAG
1603  000730  000000    BTPT:   0       ;BAD TAPE POINTER
1604  000732  000000    ERTFL:  0       ;ERASE FLAG
1605  000734  000000    ASEQF:  0       ;AUTO SEQ FLAG
1606  000736  000000    ADRVN:  0       ;UTO SEQ DRIVE NUMBER
1607  000740  000000    ABLCNT: 0       ;AUTO BLOCK COUNTER
1608  000742  000000    ASEQCF: 0       ;AUTO SEQ CONTINUOUS FLAG
1609  000744  000000    EOPB1:  0       ;EOP FLAG
1610  000746  000000    $CTRLS: 0       ;+JH XON/XOFF FLAG
```

```
1611
1612                                        ;UNIT ORDER AND DESCRIPTION TABLE **********
1613
1614  000750  000000                UN1:    0               ;THIS TABLE IS LOADED
1615  000752  000000                UN2:    0               ;WITH UNIT NUMBERS AND
1616  000754  000000                UN3:    0               ;THEIR DESCRIPTIONS IN
1617  000756  000000                UN4:    0               ;THE ORDER THAT THEY
1618  000760  000000                UN5:    0               ;WILL BE TESTED
1619  000762  000000                UN6:    0
1620  000764  000000                UN7:    0
1621  000766  000000                UN8:    0
1622  000770  177777                UNX:    -1
1623
1624                                        ;UNIT DROPS AND PICKS POINTERS*********
1625
1626  000772  001212                PIK1:   BP00
1627  000774  001232                PIK2:   BP10
1628  000776  001252                PIK3:   BP20
1629  001000  001272                PIK4:   BP30
1630  001002  001312                PIK5:   BP40
1631  001004  001332                PIK6:   BP50
1632  001006  001352                PIK7:   BP60
1633  001010  001372                PIK8:   BP70
1634  001012  001412                DRP1:   BD00
1635  001014  001432                DRP2:   BD10
1636  001016  001452                DRP3:   BD20
1637  001020  001472                DRP4:   BD30
1638  001022  001512                DRP5:   BD40
1639  001024  001532                DRP6:   BD50
1640  001026  001552                DRP7:   BD60
1641  001030  001572                DRP8:   BD70
1642
1643                                        ;UNIT BAD TAPE POINTERS**********
1644
1645  001032  001612                BTADDR: BT00
1646  001034  001716                        BT01
1647  001036  002022                        BT02
1648  001040  002126                        BT03
1649  001042  002232                        BT04
1650  001044  002336                        BT05
1651  001046  002442                        BT06
1652  001050  002546                        BT07
1653
1654                                        ;UNIT WRITE RETRY COUNTER**********
1655
1656  001052  000000                RTY1:   0
1657  001054  000000                RTY2:   0
1658  001056  000000                RTY3:   0
1659  001060  000000                RTY4:   0
1660  001062  000000                RTY5:   0
1661  001064  000000                RTY6:   0
1662  001066  000000                RTY7:   0
1663  001070  000000                RTY8:   0
1664
1665                                        ;UNIT WRITE ERRORS**********
1666
```

```
1667  001072  000000                WTER1:  0
1668  001074  000000                WTER2:  0
1669  001076  000000                WTER3:  0
1670  001100  000000                WTER4:  0
1671  001102  000000                WTER5:  0
1672  001104  000000                WTER6:  0
1673  001106  000000                WTER7:  0
1674  001110  000000                WTER8:  0
1675
1676                                      ;UNIT READ FORWARD ERRORS**********
1677
1678  001112  000000                RDER1:  0
1679  001114  000000                RDER2:  0
1680  001116  000000                RDER3:  0
1681  001120  000000                RDER4:  0
1682  001122  000000                RDER5:  0
1683  001124  000000                RDER6:  0
1684  001126  000000                RDER7:  0
1685  001130  000000                RDER8:  0
1686
1687                                      ;UNIT DATA ERRORS FORWARD**********
1688
1689  001132  000000                DATER1: 0
1690  001134  000000                        0
1691  001136  000000                        0
1692  001140  000000                        0
1693  001142  000000                        0
1694  001144  000000                        0
1695  001146  000000                        0
1696  001150  000000                        0
1697
1698                                      ;UNIT READ REVERSE ERRORS**********
1699
1700  001152  000000                RDERR1: 0
1701  001154  000000                        0
1702  001156  000000                        0
1703  001160  000000                        0
1704  001162  000000                        0
1705  001164  000000                        0
1706  001166  000000                        0
1707  001170  000000                        0
1708
1709                                      ;UNIT DATA ERRORS REVERSE**********
1710
1711  001172  000000                DEREV1: 0
1712  001174  000000                        0
1713  001176  000000                        0
1714  001200  000000                        0
1715  001202  000000                        0
1716  001204  000000                        0
1717  001206  000000                        0
1718  001210  000000                        0
```

```
1719                                    ;DROPS * PICKS PER CHANNEL PER UNIT**********
1720
1721  001212  000000            BP00:   0
1722          001232                    .=.+16
1723  001232  000000            BP10:   0
1724          001252                    .=.+16
1725  001252  000000            BP20:   0
1726          001272                    .=.+16
1727  001272  000000            BP30:   0
1728          001312                    .=.+16
1729  001312  000000            BP40:   0
1730          001332                    .=.+16
1731  001332  000000            BP50:   0
1732          001352                    .=.+16
1733  001352  000000            BP60:   0
1734          001372                    .=.+16
1735  001372  000000            BP70:   0
1736          001412                    .=.+16
1737  001412  000000            BD00:   0
1738          001432                    .=.+16
1739  001432  000000            BD10:   0
1740          001452                    .=.+16
1741  001452  000000            BD20:   0
1742          001472                    .=.+16
1743  001472  000000            BD30:   0
1744          001512                    .=.+16
1745  001512  000000            BD40:   0
1746          001532                    .=.+16
1747  001532  000000            BD50:   0
1748          001552                    .=.+16
1749  001552  000000            BD60:   0
1750          001572                    .=.+16
1751  001572  000000            BD70:   0
1752          001612                    .=.+16
1753
1754
```

```
1755
1756                                        ;UNIT BAD TAPE COUNTER:16 PER SLAVE**********
1757
1758  001612  000000                BTO0:   0
1759          001716                        .=.+102
1760  001716  000000                BTO1:   0
1761          002022                        .=.+102
1762  002022  000000                BTO2:   0
1763          002126                        .=.+102
1764  002126  000000                BTO3:   0
1765          002232                        .=.+102
1766  002232  000000                BTO4:   0
1767          002336                        .=.+102
1768  002336  000000                BTO5:   0
1769          002442                        .=.+102
1770  002442  000000                BTO6:   0
1771          002546                        .=.+102
1772  002546  000000                BTO7:   0
1773          002652                        .=.+102
1774
1775                                        ;UNIT END OF TAPE COUNTERS 1 PER SLAVE*******
1776
1777  002652  000000                EOTCO:  0
1778  002654  000000                        0
1779  002656  000000                        0
1780  002660  000000                        0
1781  002662  000000                        0
1782  002664  000000                        0
1783  002666  000000                        0
1784  002670  000000                        0
1785
1786                                        ;UNIT READ FORWARD SOFT ERROR*******
1787
1788  002672  000000                RFSOFT: 0
1789  002674  000000                        0
1790  002676  000000                        0
1791  002700  000000                        0
1792  002702  000000                        0
1793  002704  000000                        0
1794  002706  000000                        0
1795  002710  000000                        0
1796
1797                                        ;UNIT READ REVERSE SOFT ERROR*******
1798
1799  002712  000000                RRSOFT: 0
1800  002714  000000                        0
1801  002716  000000                        0
1802  002720  000000                        0
1803  002722  000000                        0
1804  002724  000000                        0
1805  002726  000000                        0
1806  002730  000000                        0
1807
```

```
1808
1809                                    ;UNIT READ FORWARD HARD ERROR*******
1810
1811  002732  000000            RFHARD: 0
1812  002734  000000                    0
1813  002736  000000                    0
1814  002740  000000                    0
1815  002742  000000                    0
1816  002744  000000                    0
1817  002746  000000                    0
1818  002750  000000                    0
1819
1820                                    ;UNIT READ REVERSE HARD ERROR*******
1821
1822  002752  000000            RRHARD: 0
1823  002754  000000                    0
1824  002756  000000                    0
1825  002760  000000                    0
1826  002762  000000                    0
1827  002764  000000                    0
1828  002766  000000                    0
1829  002770  000000                    0
1830
1831                                    ;DATA PATTERN GENERATORS*************
1832
1833  002772  002772            DATBL:  .                       ;ENTRY TABLE
1834  002774  014414            DATA0:  DAT0                    ;EXTERNAL INPUT FROM H/S READER(SEE MAINDEC-11-DZTUF)
1835  002776  014560            DATA1:  DAT1                    ;ALL ONES
1836  003000  014600            DATA2:  DAT2                    ;ALL ZEROS
1837  003002  014604            DATA3:  DAT3                    ;WALKING ONE
1838  003004  014630            DATA4:  DAT4                    ;WALKING ZERO
1839  003006  014640            DATA5:  DAT5                    ;ALTERNATING ONE/ZERO
1840  003010  014646            DATA6:  DAT6                    ;ALTERNATING ZERO/ONE
1841  003012  014654            DATA7:  DAT7                    ;ALTERNATING ONE/ZERO IN ALTERNATING CHARACTERS
1842  003014  014702            DATA10: DAT10                   ;WALKING ONE/ALL ONE IN ALTERNATING CHARACTERS
1843  003016  014732            DATA11: DAT11                   ;ALL BITS 0-377
1844  003020  014752            DATA12: DAT12                   ;ALL BITS 377-0
1845  003022  014774            DATA13: DAT13                   ;ALTERNATING CHARACTERS  0 AND 377
1846  003024  015004            DATA14: DAT14                   ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARACTERS
1847  003026  015034            DATA15: DAT15                   ;AUTO SEQUENCE PATTERN 0,0,-1,-1,-1,0,0
1848
```

```
                                        .EVEN
                                        ;*************************************************************
                                        ;PROGRAM START AND SEQUENCE FORMATTER:
                                        ;
                                        ;THIS ROUTINE IS USED TO PERFORM ALL HOUSEKEEPING,
                                        ;DECIDE WHICH TRANSPORT TO TEST AND ITS AVAILABILITY,
                                        ;LOAD THE WRITE BUFFER WITH THE SELECTED DATA PATTERN,
                                        ;GENERATE ANY RANDOM NUMBER AND THEN EXECUTE
                                        ;THE TEST CYCLE REQUESTED BY THE SWITCH SETTING.
                                        ;AT THE END OF THE TEST CYCLE THE NEXT UNIT IS SELECTED
                                        ;AND CHECKED FOR AVAILABILITY AND THE TEST CYCLE IS
                                        ;EXECUTED ON IT.
                                        ;THE READ WRITE STATS MAY BE PRINTED AT THE END OF
                                        ;EACH TEST CYCLE VIA CONSOLE SWITCH FOURTEEN (14).
                                        ;*************************************************************


                                ;START 200 & 300 **********
003030  012706  000500          START:  MOV     #500,SP         ;++G SET STACK PTR
003034  005037  000734                  CLR     ASEQF           ;CLEAR AUTO SEQUENCE FLAG
003040  005027                          CLR     (PC)+           ;;CLEAR CHAIN INDICATOR
003042  000000                  CHNFLG: .WORD   0               ;;CHAIN MODE INDICATOR
                                                                ;;1/O = CHAIN/NOT CHAIN MODE
003044  022737  005120  000042          CMP     #$ENDAD,@#42    ;;BRANCH IF LOADED VIA ACT11 CHAIN MODE
003052  001404                          BEQ     50$
003054  005737  000042                  TST     @#42            ;;BRANCH IF IN DUMP MODE
003060  001413                          BEQ     52$
003062  000406                          BR      51$
003064  012737  000176  000606  50$:    MOV     #SWREG,SWR      ;;INVOKE SOFTWARE SWR
003072  012777  100000  175506          MOV     #100000,@SWR    ;;HALT ON ERROR
003100  005237  003042          51$:    INC     CHNFLG          ;;SET CHNFLG = CHAIN MODE
003104  000137  003130                  JMP     3$              ;;GO TO CHAIN ADDRESS
003110                          52$:
003110  122737  000006  000041          CMPB    #6,@#41         ;++G BRANCH IF NOT LOADED VIA TMDP
003116  001010                          BNE     STAUT
003120  012704  027513                  MOV     #MSG120,R4
003124  104000                          TTOUTT                  ;++G ADVISE USER TO REMOVE TMDP
003126  000404                          BR      STAUT           ;++G
003130  005237  000734          3$:     INC     ASEQF           ;++G SET AUTO SEQUENCE FLAG
003134  000137  003264                  JMP     SUSWR           ;CHECK AND SET UP HRD/SOFT SWITCH REG ++ C.W

                                ;START 240 **********
003140  012737  000001  000634  STAUT:  MOV     #1,TINF         ;SET TTY ENTRY FLAG
003146  005037  015152                  CLR     RDFL            ;CLEAR RANDOM DATA FLAG
003152  000405                          BR      STARTB          ;++G

                                ;START 204 **********
003154  005037  000634          STARTC: CLR     TINF            ;CLEAR TTY INPUT FLAG
003160  000434                          BR      STARTD          ;++G

                                ;START 210 **********
003162  005037  000634          STARTA: CLR     TINF            ;CLEAR TTY ENTRY FLAG
003166  012700  000636          STARTB: MOV     #TOB,R0
003172  012701  000037                  MOV     #37,R1
003176  005020                  STARTO: CLR     (R0)+           ;CLEAR FLAGS AND COUNTERS
```

```
 1905  003200  005301                        DEC     R1
 1906  003202  001375                        BNE     STARTO
 1907  003204  012706  000500                MOV     #500,SP         ;SET STACK POINTER
 1908  003210  004737  004374                JSR     PC,RANSET       ;GO RESET RANDOM BASE
 1909  003214  012700  001052                MOV     #RTY1,R0
 1910  003220  012701  000750                MOV     #750,R1
 1911  003224  005020            STARTF:     CLR     (R0)+           ;CLEAR STATISTIC COUNTERS
 1912  003226  005301                        DEC     R1
 1913  003230  001375                        BNE     STARTF
 1914  003232  012737  177777  014410        MOV     #-1,PATS        ;PRESET PATTERN
 1915  003240  005037  000744                CLR     EOPB1
 1916  003244  012737  000001  000654  STARTE:  MOV   #1,@LCNTR      ;PRESET BLOCK COUNTER
 1917  003252  012706  000500            STARTD:  MOV   #500,SP
 1918  003256  012777  000340  175320            MOV   #340,@PSW
 1919  003264  013746  000006            SUSWR:  MOV   @#6,-(SP)             ;SAVE VECTORS
 1920  003270  013746  000004                    MOV   @#4,-(SP)
 1921  003274  012737  003314  000004            MOV   #1$,@#4               ;SET UP FOR TIMEOUT
 1922  003302  022777  177777  175276            CMP   #-1,@SWR              ;REFERENCE HARDWARE SWITCH REGISTER
 1923  003310  001402                            BEQ   2$
 1924  003312  000404                            BR    3$
 1925  003314  022626                    1$:     CMP   (SP)+,(SP)+           ;ADJUST STACK
 1926  003316  012737  000176  000606    2$:     MOV   #SWREG,SWR            ;POINT TO SOFTWARE SWITCH REG
 1927  003324  012637  000004            3$:     MOV   (SP)+,@#4             ;RESTORE VECTORS
 1928  003330  012637  000006                    MOV   (SP)+,@#6
 1929  003334  022737  000176  000606            CMP   #SWREG,SWR            ;IS SWREG SELECTED
 1930  003342  001020                            BNE   4$
 1931  003344  005737  000744                    TST   EOPB1
 1932  003350  001015                            BNE   4$
 1933  003352  005037  000744                    CLR   EOPB1
 1934  003356  022737  005120  000042            CMP   #$ENDAD,@#42    ;ACT MODE? ++ C.W
 1935  003364  001402                            BEQ   6$              ;BRANCH - IF YES ++ C.W
 1936  003366  004737  024600                    JSR   PC,CNTLU        ;CHECK FOR CONTROL G
 1937  003372  005737  000734            6$:     TST   ASEQF           ;AUTO SEQ MODE? ++ C.W
 1938  003376  001402                            BEQ   4$              ;BRANCH - IF NO ++ C.W
 1939  003400  000137  022052                    JMP   ASEQ0           ;GO DO AUTO SEQ ++ C.W
 1940  003404  004737  012402            4$:     JSR   PC,TINP         ;GO GET PARAMETERS FROM TTY
 1941  003410  012777  000040  175102            MOV   #40,@CS         ;INITIALIZE
 1942  003416  005000                    STAUTO: CLR   R0              ;POINT TO FIRST ENTRY
 1943  003420  022760  177777  000750  1$:     CMP   #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
 1944  003426  001406                            BEQ   2$
 1945  003430  042760  100000  000750            BIC   #100000,UN1(R0) ;CLEAR EOT FLAG
 1946  003436  062700  000002                    ADD   #2,R0           ;POINT TO NEXT UNIT ENTRY
 1947  003442  000766                            BR    1$              ;++G CONTINUE CLEARING
 1948  003444  013703  005160            2$:     MOV   REOTC,R3
 1949  003450  000303                            SWAB  R3
 1950  003452  110337  005160                    MOVB  R3,REOTC        ;RESTORE EOT CNTR
 1951  003456  012777  000100  175124  START1: MOV   #100,@TKS         ;SET TTY INTERRUPT ENABLE
 1952  003464  013700  000674                    MOV   UNP,R0          ;R0 = UNIT TABLE POINTER
 1953  003470  022760  177777  000750  STAR1A: CMP   #-1,UN1(R0)      ;++G BRANCH IF LAST ENTRY
 1954  003476  001404                            BEQ   STAR1B          ;IF LAST UNIT IN STRING: BR
 1955  003500  016037  000750  000552            MOV   UN1(R0),UDES    ;LOAD NEXT UNIT DESCRIPTION
 1956  003506  000446                            BR    START4          ;++G
 1957  003510  005237  000654  STAR1B: INC   BLCNTR          ;BUMP BLOCK COUNTER
 1958  003514  005737  000734                    TST   ASEQF           ;SEE IF AUTO SEQ
 1959  003520  001411                            BEQ   STAR1C          ;IF NOT: BR
 1960  003522  023737  000654  000740            CMP   BLCNTR,ABLCNT   ;SEE IF DONE SEQ
```

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1961  003530  001005                        BNE     STAR1C          ;IF NOT: BR
1962  003532  005037  000654                CLR     BLCNTR          ;RESET BLOCK CNTR
1963  003536  005037  000674                CLR     UNP             ;RESET UNIT POINTER
1964  003542  000207                        RTS     PC              ;RETURN TO AUTO SEQ
1965
1966  003544  005037  000674        STAR1C: CLR     UNP
1967  003550  005000                        CLR     R0
1968  003552  016037  000750  000552        MOV     UN1(R0),UDES    ;LOAD FIRST UNIT DESCRIPTION
1969  003560  105777  175022                TSTB    @SWR            ;**G BRANCH IF NOT RANDOM RECORD
1970  003564  100003                        BPL     START2          ;**G SIZE REQUESTED.
1971  003566  001402                        BEQ     START2          ;IF NOT: BR
1972  003570  004737  012316                JSR     PC,CCNTR        ;GO GENERATE RANDOM RECORD SIZE
1973  003574  032777  000400  175004  START2: BIT     #400,@SWR       ;SEE IF RANDOM DATA
1974  003602  001402                        BEQ     START3          ;IF NOT: BR
1975  003604  004737  015104                JSR     PC,DATR         ;GO GENERATE RANDOM DATA
1976  003610  032777  000100  174770  START3: BIT     #100,@SWR       ;SEE IF RANDOM RECORD COUNT
1977  003616  001402                        BEQ     START4          ;IF NOT: BR
1978  003620  004737  012356                JSR     PC,RCNTR        ;GO GENERATE RANDOM RECORD COUNT
1979  003624  005760  000750        START4: TST     UN1(R0)         ;**G BRANCH IF NOT AT EOT
1980  003630  100002                        BPL     STAR40          ;IF NOT: BR
1981  003632  000137  004362                JMP     START7          ;ELSE GO TO NEXT UNIT
1982  003636  013777  000550  174654  STAR40: MOV     DVN,@CS         ;SET DRIVE NUMBER
1983  003644  013777  000552  174670        MOV     UDES,@C2        ;SET UNIT NUMBER
1984  003652  105777  174644                TSTB    @DS             ;**G BRANCH IF UNIT AVAIL
1985  003656  100412                        BMI     STAR4A
1986  003660  005337  000666                DEC     STAL
1987  003664  001357                        BNE     START4          ;AWAIT TUR
1988  003666  004737  022772                JSR     PC,PAPRT        ;PRINT HEADER
1989  003672  012704  026214                MOV     #MSG49,R4
1990  003676  104000                        TTOUTT  ;PRINT NOT AVAIL
1991  003700  104006                        STOPP                   ;STOP
1992  003702  000750                        BR      START4          ;**G RETRY
1993  003704  013746  000552        STAR4A: MOV     UDES,-(SP)      ;GET UNIT DESCRIPTION
1994  003710  042716  175400                BIC     #175400,(SP)    ;**G CLEAR ALL BUT FORMAT BITS
1995                                        ;CMP    #1700,(SP)+     ;**G BRANCH IF NRZ
1996  003714  032726  002000                BIT     #2000,(SP)+     ;**H BRANCH IF NZR
1997  003720  001406                        BEQ     1$              ;**G
1998  003722  032777  000040  174572        BIT     #40,@DS         ;**G BRANCH IF SLAVE IN PE FORMAT
1999  003730  001002                        BNE     1$              ;**G
2000  003732  000137  004362                JMP     START7          ;**G GO TO NEXT UNIT
2001  003736  004737  014202        1$:     JSR     PC,DSUP         ;GO SET UP WRITE DATA
2002  003742  004737  005162                JSR     PC,RWND         ;REWIND
2003  003746  004737  005524                JSR     PC,WRITE        ;WRITE
2004  003752  013737  000576  000666        MOV     TSTAL,STAL      ;SET TURN AROUND DELAY
2005  003760  004737  012306                JSR     PC,STALL                ;DELAY
2006  003764  004737  007416                JSR     PC,RSEQ         ;GO TO READ SEQUENCER
2007  003770  013737  000576  000666        MOV     TSTAL,STAL      ;SET TURN AROUND DELAY
2008  003776  004737  012306                JSR     PC,STALL        ;DELAY
2009  004002  032777  040000  174576        BIT     #40000,@SWR     ;SEE IF SHOULD PRINT STATISTICS
2010  004010  001541                        BEQ     START5          ;IF NOT: BR
2011  004012  012700  000001                MOV     #1,R0           ;SET RECORD COUNTER TO 1
2012  004016  004737  022772                JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
2013  004022  004737  004032                JSR     PC,STP          ;GO PRINT STATS
2014  004026  000137  004300                JMP     STPX
2015  004032  004737  017252        STP:    JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
2016  004036  012704  026427                MOV     #MSG65,R4
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2017  004042  104000
2018  004044  013704  000674          TTOUTT  ;PRINT RETRY TOTAL
2019  004050  016403  001052          MOV     UNP,R4
2020  004054  104002                  MOV     RTY1(R4),R3
2021  004056  012704  026600          OCTPP                   ;PRINT RETRIES
2022  004062  104000                  MOV     #MSG73,R4
2023  004064  013704  000674          TTOUTT                  ;PRINT WRITE ERROR TAG
2024  004070  016403  001072          MOV     UNP,R4
2025  004074  104002                  MOV     WTER1(R4),R3
2026  004076  012704  026567          OCTPP                   ;PRINT WRITE ERRORS
2027  004102  104000                  MOV     #MSG72,R4
2028  004104  013704  000674          TTOUTT                  ;PRINT READ FORWARD ERROR TAG
2029  004110  016403  001112          MOV     UNP,R4
2030  004114  104002                  MOV     RDER1(R4),R3
2031  004116  012704  027375          OCTPP                   ;PRINT READ FORWARD ERRORS
2032  004122  104000                  MOV     #MSG113,R4
2033  004124  013704  000674          TTOUTT                  ;PRINT SOFT TAG
2034  004130  016403  002672          MOV     UNP,R4
2035  004134  104002                  MOV     RFSOFT(R4),R3
2036  004136  012704  027406          OCTPP                   ;PRINT FORWARD SOFT ERRORS
2037  004142  104000                  MOV     #MSG114,R4
2038  004144  013704  000674          TTOUTT                  ;PRINT HARD TAG
2039  004150  016403  002732          MOV     UNP,R4
2040  004154  104002                  MOV     RFHARD(R4),R3
2041  004156  012704  026660          OCTPP                   ;PRINT HARD FORWARE ERRORS
2042  004162  104000                  MOV     #MSG77,R4
2043  004164  013704  000674          TTOUTT                  ;PRINT DATA ERROR FORWARD TAG
2044  004170  016403  001132          MOV     UNP,R4
2045  004174  104002                  MOV     DATER1(R4),R3
2046  004176  012704  026463          OCTPP                   ;PRINT DATA ERROR FORWARD NUMBER
2047  004202  104000                  MOV     #MSG68,R4
2048  004204  013704  000674          TTOUTT                  ;PRINT READ ERROR REVERSE TAG
2049  004210  016403  001152          MOV     UNP,R4
2050  004214  104002                  MOV     RDERR1(R4),R3
2051  004216  012704  027375          OCTPP                   ;PRINT REVESE ERROR NUMBER
2052  004222  104000                  MOV     #MSG113,R4
2053  004224  013704  000674          TTOUTT                  ;PRINT SOFT TAG
2054  004230  016403  002712          MOV     UNP,R4
2055  004234  104002                  MOV     RRSOFT(R4),R3
2056  004236  012704  027406          OCTPP                   ;PRINT REVERSE SOFT ERROR
2057  004242  104000                  MOV     #MSG114,R4
2058  004244  013704  000674          TTOUTT                  ;PRINT HARD TAG
2059  004250  016403  002752          MOV     UNP,R4
2060  004254  104002                  MOV     RRHARD(R4),R3
2061  004256  012704  026647          OCTPP
2062  004262  104000                  MOV     #MSG76,R4
2063  004264  013704  000674          TTOUTT                  ;PRINT DATA ERROR REVERSE TAG
2064  004270  016403  001172          MOV     UNP,R4
2065  004274  104002                  MOV     DEREV1(R4),R3
2066  004276  000207                  OCTPP                   ;PRINT DATA REVERSE ERROR NUMBER
                                      RTS     PC              ;RETURN
2067  004300  005237  000726  STPX:   INC     BTSTF           ;SET STAT ONLY PRINT
2068  004304  004737  007326          JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
2069  004310  005037  000726          CLR     BTSTF           ;CLEAR FLAG
2070  004314  017700  174266  START5: MOV     @SWR,R0         ;LOAD SWR
2071  004320  042700  177762          BIC     #177762,R0      ;MASK READ/WRITE SWITCHES
2072  004324  022700  000015          CMP     #15,R0          ;SEE IF HAVE READ OR WRITE
```

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2073  004330  001417                        BEQ     START8          ;IF NOT: BR
2074  004332  105777  174164        START6: TSTB    @DS             ;++G BRANCH IF HAVE UNIT READY
2075  004336  100411                        BMI     START7          ;++G
2076  004340  005337  000666                DEC     STAL
2077  004344  001372                        BNE     START6          ;DELAY FOR TUR
2078  004346  004737  022772                JSR     PC,PAPRT        ;PRINT HEADER
2079  004352  012704  026214                MOV     #MSG49,R4
2080  004356  104000                        TTOUTT                  ;PRINT NOT AVAIL
2081  004360  104006                        STOPP                       ;STOP
2082  004362  062737  000002  000674 START7: ADD     #2,UNP          ;POINT TO NEXT UNIT
2083  004370  000137  003456        START8: JMP     START1          ;CONTINUE
2084
2085                                        ;RANDOM BASE RESET**********
2086
2087  004374  012737  153624  000624 RANSET: MOV     #153624,RANBAS  ;RESET BASE
2088  004402  012737  032561  000626         MOV     #32561,RANSAV   ;RESET BUFFER
2089  004410  013737  000630  000554         MOV     RCSAV,RCNT      ;RESET RECORD COUNT
2090  004416  013737  000632  000556         MOV     FCSAV,FMCNT     ;RESET FRAME COUNT
2091  004424  000207                        RTS     PC
2092
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2093                                    ;************************************************************
2094                                    ;REWIND FROM EOT:
2095                                    ;
2096                                    ;WHEN ANY TRANSPORT BEING TESTED REACHES END OF TAPE
2097                                    ;DURING A READ OR WRITE OPERATION, IT WILL BE REWOUND
2098                                    ;AND FLAGGED AS UNAVAILABLE UNTIL ALL AVAILABLE UNITS
2099                                    ;HAVE REACHED EOT AT WHICH TIME ALL TESTING WILL BE RESUMED
2100                                    ;AT A BLOCK COUNT OF ONE (1).  A MESSAGE WILL BE
2101                                    ;PRINTED ON THE SUPERVISORS CONSOLE AS EACH UNIT REACHES
2102                                    ;EOT AND IS REWOUND.
2103                                    ;************************************************************
2104
2105  004426  013777  000552  174106  REOT:   MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2106  004434  012777  000011  174046          MOV     #11,@C1         ;DRIVE CLEAR
2107  004442  105777  174054          1$:     TSTB    @DS             ;++G WAIT FOR DRIVE READY
2108  004446  100375                          BPL     1$              ;AWAIT DRY
2109  004450  012777  000007  174032          MOV     #7,@C1          ;START REWIND
2110  004456  005737  000724                  TST     BTFLG           ;SEE IF BAD TAPE OVERFLOW REWIND
2111  004462  001004                          BNE     REOT1A          ;IF SO: BR
2112  004464  013700  000660                  MOV     EOTREC,R0
2113  004470  042700  100000                  BIC     #100000,R0      ;SET RECORD NUMBER OF EOT
2114  004474  005037  000660          REOT1A: CLR     EOTREC          ;++G CLEAR EOT IND & REC CTR
2115  004500  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2116  004504  022737  000002  000724          CMP     #2,BTFLG        ;SEE IF POSITION ERROR
2117  004512  001003                          BNE     REOT1B          ;IF NOT: BR
2118  004514  012704  027266                  MOV     #MSG109,R4      ;SET POSITION ERROR MSG
2119  004520  000406                          BR      REOT1F
2120  004522  022737  000001  000724  REOT1B: CMP     #1,BTFLG        ;SEE IF BAD TAPE OVERFLOW
2121  004530  001004                          BNE     REOT1C          ;IF NOT: BR
2122  004532  012704  027077                  MOV     #MSG106,R4      ;SET BAD TAPE OVERFLOW MSG
2123  004536  104000          REOT1F: TTOUTT                          ;PRINT REWIND REASON
2124  004540  000412                          BR      REOT1E
2125  004542  012704  025246          REOT1C: MOV     #MSG20,R4       ;SET EOT MSG
2126  004546  104000          REOT1D: TTOUTT                          ;PRINT MSG
2127  004550  013704  000674                  MOV     UNP,R4
2128  004554  005264  002652                  INC     EOTCO(R4)       ;BUMP CNTR
2129  004560  016403  002652                  MOV     EOTCO(R4),R3
2130  004564  104002                          OCTPP                   ;PRINT EOT CNTR
2131  004566  012704  027124          REOT1E: MOV     #MSG16A,R4
2132  004572  104000                          TTOUTT                  ;PRINT RESTART MSG
2133  004574  005037  000724                  CLR     BTFLG           ;CLEAR BAD TAPE FLAG
2134  004600  004737  004032                  JSR     PC,STP          ;PRINT STATS
2135  004604  004737  007326                  JSR     PC,BTPRT        ;PRINT BAD TAPE STATS
2136  004610  105777  173706          REOT2:  TSTB    @DS             ;++G BRANCH IF UNIT IS READY
2137  004614  100414                          BMI     REOT2A
2138  004616  005337  000666                  DEC     STAL
2139  004622  001372                          BNE     REOT2           ;WAIT DRY
2140  004624  012737  025107  000652          MOV     #MSG6,EMADDR
2141  004632  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2142  004636  012704  026371                  MOV     #MSG60,R4
2143  004642  104000                          TTOUTT                  ;PRINT NO DRIVE READY
2144  004644  104006                          STOPP
2145  004646  105337  005160          REOT2A: DECB    REOTC           ;SEE IF LAST UNIT TO REACH EOT
2146  004652  001410                          BEQ     REOT3           ;IF SO: BR
2147  004654  013700  000674                  MOV     UNP,R0
2148  004660  052760  100000  000750          BIS     #100000,UN1(R0) ;SET EOT FLAG
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2149  004666  005726                          TST     (SP)+           ;RESET STACK POINTER
2150  004670  000137  004362                  JMP     START7          ;GO TO NEXT UNIT
2151  004674  000337  005160          REOT3:  SWAB    REOTC
2152  004700  013700  005160                  MOV     REOTC,R0
2153  004704  000337  005160                  SWAB    REOTC
2154  004710  110037  005160                  MOVB    R0,REOTC        ;RESTORE EOT UNIT COUNTER
2155  004714  005037  000674                  CLR     UNP
2156  004720  013700  000674                  MOV     UNP,R0          ;POINT TO FIRST UNIT
2157  004724  016037  000750  000552  REOT4:  MOV     UN1(R0),UDES    ;LOAD UNIT DESCRIPTION
2158  004732  013777  000552  173602          MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2159  004740  032777  020000  173554  REOT5:  BIT     #20000,@DS
2160  004746  001374                          BNE     REOT5           ;AWAIT PIP RESET
2161  004750  032777  000002  173544          BIT     #2,@DS          ;SEE IF HAVE BOT
2162  004756  001012                          BNE     REOT6           ;IF SO: BR
2163  004760  012700  000001                  MOV     #1,R0
2164  004764  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2165  004770  012704  026162                  MOV     #MSG48,R4
2166  004774  104000                          TTOUTT                  ;PRINT BOT ERROR
2167  004776  104006                          STOPP
2168  005000  013700  000674                  MOV     UNP,R0
2169  005004  042760  100000  000750  REOT6:  BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
2170  005012  062737  000002  000674          ADD     #2,UNP
2171  005020  013700  000674                  MOV     UNP,R0          ;POINT TO NEXT UNIT
2172  005024  022760  177777  000750          CMP     #-1,UN1(R0)     ;++G BRANCH IF NOT LAST UNIT
2173  005032  001334                          BNE     REOT4           ;++
2174  005034  005037  000674          REOT7:  CLR     UNP             ;CLEAR UNIT POINTER
2175  005040  005037  000634                  CLR     TINF            ;CLEAR TTY INPUT FLAG
2176  005044  005737  000734                  TST     ASEQF           ;SEE IF AUTO SEQ
2177  005050  001402                          BEQ     REOTX           ;IF NOT: BR
2178  005052  005726                          TST     (SP)+           ;RESET STACK POINTER
2179  005054  000412                          BR      TEND            ;GO DO END OF PASS ++ C.W
2180
2181  005056  004737  004374          REOTX:  JSR     PC,RANSET       ;GO RESET RANDOM BASE
2182  005062  012737  177777  014410          MOV     #-1,PATS        ;PRESET PATTERN
2183  005070  005037  015152                  CLR     RDFL            ;CLEAR RANDOM FLAG
2184  005074  005737  000570                  TST     SPFLG           ;SEE IF SINGLE PASS
2185  005100  001420                          BEQ     REOTXX          ;IF NOT: BR
2186  005102  012704  026772          TEND:   MOV     #MSG100,R4
2187  005106  104000                          TTOUTT                  ;PRINT END OF PASS
2188  005110  013700  000042                  MOV     @#42,R0         ;GET ACT11 RETURN ADDRESS
2189  005114  001405                          BEQ     HERE            ;BRANCH IF NOT ACT11
2190  005116  000005                          RESET
2191  005120  004710                  $ENDAD: JSR     PC,(R0)
2192  005122  000240                          NOP
2193  005124  000240                          NOP
2194  005126  000240                          NOP
2195  005130  005737  000734          HERE:   TST     ASEQF           ;AUTO MODE? ++ C.W
2196  005134  001401                          BEQ     1$              ;BRANCH - IF NO ++ C.W
2197  005136  000207                          RTS     PC              ;RETURN TO AUTO SEQ ++ C.W
2198  005140  104006                  1$:     STOPP
2199  005142  012704  026772          REOTXX: MOV     #MSG100,R4      ;GET END OF PASS MESSAGE ++ C.W
2200  005146  104000                          TTOUTT                  ;PRINT MESSAGE ++ C.W
2201  005150  005237  000744                  INC     EOPB1
2202  005154  000137  003244                  JMP     STARTE          ;RESTART AT BLOCK NUMBER ONE
2203  005160  000000                  REOTC:  0                       ;EOT UNIT COUNTER
```

```
2204                                    ;*************************************************************
2205                                    ;REWIND ALL AVAIL TAPES:
2206                                    ;
2207                                    ;THIS ROUTINE; ENTERED VIA CONSOLE SWITCH NINE (9),
2208                                    ;WILL REWIND ALL AVAILABLE TAPES TO BOT NO MATTER
2209                                    ;WHERE THEY ARE CURRENTLY POSITIONED AND RESUME TESTING
2210                                    ;ON THE CURRENTLY SELECTED UNIT.
2211                                    ;*************************************************************
2212
2213  005162  032777  001000  173416  RWND:   BIT     #1000,@SWR      ;SEE IF SHOULD REWIND
2214  005170  001001                  BNE     RWNDA           ;IF SO: BR
2215  005172  000207                  RTS     PC              ;ELSE EXIT
2216  005174  013737  000674  000714  RWNDA:  MOV     UNP,UPS         ;SAVE UNIT POINTER
2217  005202  005037  000674          CLR     UNP             ;CLEAR POINTER
2218  005206  005037  000660          CLR     EOTREC          ;CLEAR EDT FLAG
2219  005212  000337  005160          SWAB    REOTC
2220  005216  013700  005160          MOV     REOTC,R0
2221  005222  000337  005160          SWAB    REOTC
2222  005226  110037  005160          MOVB    R0,REOTC        ;RESTORE EOT UNIT COUNTER
2223  005232  013700  000674  RWND0:  MOV     UNP,R0          ;POINT TO UNIT ENTRY
2224  005236  022760  177777  000750  CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
2225  005244  001445                  BEQ     RWND2           ;IF SO: BR
2226  005246  005760  000750          TST     UN1(R0)         ;++G BRANCH IF ALREADY REWINDING
2227  005252  100433                  BMI     RWND1A          ;++G
2228  005254  016037  000750  000552  MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
2229  005262  013777  000552  173252  MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2230  005270  012777  000011  173212  MOV     #11,@C1         ;DRIVE CLEAR
2231  005276  012777  000007  173204  MOV     #7,@C1          ;START REWIND
2232  005304  105777  173212  RWND1:  TSTB    @DS             ;++G WAIT FOR DRIVE READY
2233  005310  100414                  BMI     RWND1A          ;IF DRY: BR
2234  005312  005337  000666          DEC     STAL
2235  005316  001372                  BNE     RWND1           ;AWAIT DRY
2236  005320  012737  025107  000652  MOV     #MSG6,EMADDR
2237  005326  004737  022772          JSR     PC,PAPRT        ;PRINT HEADER
2238  005332  012704  026512          MOV     #MSG70,R4
2239  005336  104000                  TTOUTT                  ;PRINT NO DRIVE READY
2240  005340  104006                  STOPP
2241  005342  042760  100000  000750  RWND1A: BIC     #100000,UN1(R0) ;CLEAR EOT FLAG
2242  005350  062737  000002  000674          ADD     #2,UNP          ;BUMP POINTER
2243  005356  000725                  BR      RWND0           ;++G DO NEXT UNIT
2244  005360  005037  000674          RWND2:  CLR     UNP             ;CLEAR POINTER
2245  005364  013700  000674          RWND3:  MOV     UNP,R0          ;POINT TO UNIT ENTRY
2246  005370  022760  177777  000750          CMP     #-1,UN1(R0)     ;++G BRANCH IF LAST ENTRY
2247  005376  001436                  BEQ     RWNDX           ;IF SO: BR
2248  005400  016037  000750  000552  MOV     UN1(R0),UDES    ;SET UNIT DESCRIPTION
2249  005406  013777  000552  173126  MOV     UDES,@C2        ;LOAD COMMAND REGISTER
2250  005414  032777  020000  173100  RWND4:  BIT     #20000,@DS
2251  005422  001374                  BNE     RWND4           ;AWAIT PIP RESET
2252  005424  032777  000002  173070          BIT     #2,@DS          ;SEE IF HAVE BOT
2253  005432  001407                  BEQ     RWND6           ;IF NOT: BR
2254  005434  062737  000002  000674  RWND5:  ADD     #2,UNP          ;BUMP POINTER
2255  005442  012777  000011  173040          MOV     #11,@C1         ;DRIVE CLEAR
2256  005450  000745                  BR      RWND3           ;++G DO NEXT UNIT
2257  005452  012700  000001          RWND6:  MOV     #1,R0
2258  005456  004737  022772          JSR     PC,PAPRT        ;PRINT HEADER
2259  005462  012704  026162          MOV     #MSG48,R4
```

L4


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 2260  005466  104000                          TTOUTT                  ;PRINT NO BOT
 2261  005470  104006                          STOPP
 2262  005472  000760                          BR      RWND5           ;++G DO NEXT UNIT
 2263  005474  013737  000714  000674  RWNDX:  MOV     UPS,UNP         ;RESTORE UNIT POINTER
 2264  005502  013700  000674                  MOV     UNP,R0
 2265  005506  016037  000750  000552          MOV     UN1(R0),UDES    ;RESET UNIT DESCRIPTION
 2266  005514  013777  000552  173020          MOV     UDES,@C2
 2267  005522  000207                          RTS     PC              ;RETURN TO TEST
 2268
```

```
2269                                    ;*************************************************************
2270                                    ;WRITE ROUTINE:
2271                                    ;
2272                                    ;THIS ROUTINE IS USED TO WRITE ONTO TAPE THE BLOCK
2273                                    ;OF DATA DESCRIBED BY THE OPERATOR AND SET UP
2274                                    ;IN THE SEQUENCE FORMATTER.  THE TAPE UNIT TO BE USED
2275                                    ;HAS BEEN ASSIGNED BY THE SEQUENCE FORMATTER AND
2276                                    ;ITS PARAMETERS SET IN A UNIT DESCRIPTION WORD.
2277                                    ;AS EACH RECORD OF THE BLOCK IS WRITTEN, IT IS CHECKED
2278                                    ;FOR STATUS ERRORS, WORD COUNT ZERO, AND CORRECT CURRENT
2279                                    ;MEMORY ADDRESS.  IF THE WRITE OPERATION RESULTS IN
2280                                    ;ANY ERROR CONDITION, A WRITE RETRY OF THAT OPERATION
2281                                    ;MAY BE DONE BY SETTING SWITCH FOUR (4) TO A ONE (1).
2282                                    ;THE RETRY CONSISTS OF A BACKSPACE, ERASE FORWARD, AND
2283                                    ;REWRITE OF THE RECORD.  (SEE WRITE RETRY SUBROUTINE)
2284                                    ;AFTER ALL DATA RECORDS IN THE BLOCK HAVE BEEN
2285                                    ;WRITTEN, THE WRITE ROUTINE WILL EXECUTE A WRITE
2286                                    ;TAPE MARK COMMAND IF THE TTY RESPONSE TM=1 WAS
2287                                    ;MADE AT INITIAL START.  THE TM IS COUNTED AS TOTAL
2288                                    ;DATA RECORDS PLUS ONE (IE: IF 100 DATA RECORDS; TM=RECORD 101)
2289                                    ;IF THE WRITE OPERATION (DATA OR TM) CAUSES THE SELECTED SLAVE
2290                                    ;TO REACH END OF TAPE (EOT) AND THERE IS TO BE NO READING DONE,
2291                                    ;(SW2 AND SW3 SET TO A 1) THEN THE SLAVE IS REWOUND AND
2292                                    ;FLAGGED AS UNAVAILABLE FOR TESTING UNTIL ALL SLAVES HAVE
2293                                    ;REACHED EOT AND BEEN REWOUND AT WHICH TIME TESTING IS
2294                                    ;RESUMED ON ALL AVAILABLE SLAVES.
2295                                    ;WRITE RETRY MAY BE ALLOWED VIA CONSOLE SWITCH FOUR (4).
2296                                    ;ERROR CHECKING MAY BE DISALLOWED VIA CONSOLE SWITCH
2297                                    ;TWELVE (12).
2298                                    ;WRITING TO TAPE MAY BE DISALLOWED VIA CONSOLE SWITCH
2299                                    ;ZERO (0).
2300                                    ;*************************************************************
2301
2302  005524  032777  000001  173054  WRITE:  BIT     #1,@SWR          ;SEE IF SHOULD WRITE
2303  005532  001402                          BEQ     WRTE
2304  005534  000137  006322                  JMP     WEX              ;IF NOT: BR
2305  005540  013700  000554          WRTE:   MOV     RCNT,R0          ;R0=RECORD COUNT
2306  005544  012737  025102  000652  W0:     MOV     #MSG5,EMADDR     ;SET ERROR MSG ADDRESS
2307  005552  013777  000556  172736          MOV     FMCNT,@FC        ;LOAD CHAR COUNT
2308  005560  012777  027604  172726          MOV     #WDATA,@BA       ;SET DATA ADDR
2309  005566  112737  000060  000672          MOVB    #60,MTC1         ;SET WRITE OP COMMAND
2310  005574  012737  005606  000662          MOV     #W1,RTRN         ;SET RETURN ADDRESS
2311  005602  000137  021220                  JMP     TAPG             ;GO EXECUTE COMMAND
2312  005606  032777  002000  172706  W1:     BIT     #2000,@DS        ;SEE IF EOT
2313  005614  001414                          BEQ     W2               ;IF NOT AT EOT: BR
2314  005616  005737  000660                  TST     EOTREC           ;++G BRANCH IF WRITTEN PAST EOT
2315  005622  100411                          BMI     W2               ;++G
2316  005624  010037  000660                  MOV     R0,EOTREC        ;SAVE EOT RECORD NUMBER
2317  005630  052737  100000  000660          BIS     #100000,EOTREC   ;++G SET EOT FLAG
2318  005636  005337  000660                  DEC     EOTREC           ;++G ADJUST RECORD COUNT
2319  005642  012700  000002                  MOV     #2,R0            ;++G SET R0 TO WRITE 1 MORE RECORD
2320  005646  032777  010000  172732  W2:     BIT     #10000,@SWR      ;SEE IF SHOULD CHECK ERRORS
2321  005654  001002                          BNE     W3               ;IF NOT: BR
2322  005656  004737  017410                  JSR     PC,ERCHK         ;GO CHECK ERRORS
2323  005662  013737  000574  000666  W3:     MOV     WSTAL,STAL       ;SET DELAY
2324  005670  004737  012306                  JSR     PC,STALL         ;DELAY
```

```
2325  005674  005737  000712                TST     RTYFL           ;SEE IF RETRY TIME
2326  005700  001401                      BEQ     W3A             ;IF NOT: BR
2327  005702  000207                      RTS     PC              ;ELSE RETURN
2328  005704  005737  000706        W3A:  TST     SERFL           ;SEE IF WRITE ERROR
2329  005710  001450                      BEQ     W5              ;IF NOT: BR
2330  005712  013704  000674              MOV     UNP,R4
2331  005716  005264  001072              INC     WTER1(R4)       ;BUMP WRITE ERROR
2332  005722  005037  000706              CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2333  005726  032777  000020  172652      BIT     #20,@SWR        ;SEE IF RETRY
2334  005734  001436                      BEQ     W5              ;IF NOT: BR
2335  005736  013703  000722              MOV     ERSAV,R3
2336  005742  042703  102700              BIC     #102700,R3      ;MASK UNRECOVERABLE ERROR
2337  005746  001410                      BEQ     W4              ;IF SO: BR
2338  005750  004737  022772              JSR     PC,PAPRT        ;PRINT HEADER
2339  005754  012704  026671              MOV     #MSG78,R4
2340  005760  104000                      TTOUTT                  ;PRINT NON-RETRYABLE ERROR TAG
2341  005762  004737  011262              JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2342  005766  000421                      BR      W5
2343  005770  013704  000674        W4:   MOV     UNP,R4
2344  005774  005264  001052              INC     RTY1(R4)        ;BUMP RETRY CNTR
2345  006000  032777  002000  172600      BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2346  006006  001003                      BNE     W4A             ;IF NOT: BR
2347  006010  012704  026405              MOV     #MSG64,R4
2348  006014  104000                      TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2349  006016  005037  000702        W4A:  CLR     RTCNT           ;CLEAR RETRY NUMBER
2350  006022  005037  000700              CLR     RPCNT           ;CLEAR REPEAT COUNTER
2351  006026  004737  006364              JSR     PC,WRTY         ;GO RETRY WRITE ERROR
2352  006032  005037  000712        W5:   CLR     RTYFL           ;CLEAR RETRY COUNTER
2353  006036  005300                      DEC     R0              ;SEE IF DONE ALL
2354  006040  001241                      BNE     W0              ;IF NOT: BR
2355  006042  005737  000564        W6:   TST     TMEX            ;SEE IF TM
2356  006046  001525                      BEQ     WEX             ;IF NOT: BR
2357  006050  005237  000676              INC     TMFLG           ;SET TM FLAG
2358  006054  012737  026312  000652  WTM:  MOV     #MSG54,EMADDR   ;POINT TO TM ERROR MSG
2359  006062  012737  000026  000672      MOV     #26,MTC1        ;SET TM OP CODE
2360  006070  012777  000000  172420      MOV     #0,@FC          ;LOAD FRAME COUNTER
2361  006076  012777  027604  172410      MOV     #WDATA,@BA      ;LOAD BUS ADDRESS
2362  006104  012737  006116  000662      MOV     #WTM0,RTRN      ;SAVE RETURN ADDRESS
2363  006112  000137  021220              JMP     TAPG            ;WRITE TM
2364  006116  032777  010000  172462  WTM0: BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERRORS
2365  006124  001076                      BNE     WEX
2366  006126  032777  000004  172366      BIT     #4,@DS          ;SEE IF TM STATUS
2367  006134  001011                      BNE     WTM1            ;IF SO: BR
2368  006136  012737  027604  021134      MOV     #WDATA,CADER    ;SET EXPT BUS ADDRESS
2369  006144  012737  000001  021142      MOV     #1,DRVER        ;INDICATE ERROR
2370  006152  004737  020236              JSR     PC,ERPT         ;PRINT TM ERROR
2371  006156  000404                      BR      WTM2
2372  006160  012703  027604        WTM1: MOV     #WDATA,R3       ;SET EXPT ADDRESS
2373  006164  004737  017506              JSR     PC,ER2          ;GO CHECK FOR OTHER ERRORS
2374  006170  005737  000712        WTM2: TST     RTYFL           ;SEE IF RETRY
2375  006174  001401                      BEQ     WTM3            ;IF NOT: BR
2376  006176  000207                      RTS     PC              ;ELSE RETURN TO RETRY ROUTINE
2377  006200  005737  000706        WTM3: TST     SERFL           ;SEE IF WRITE ERROR
2378  006204  001446                      BEQ     WEX             ;IF NOT: BR
2379  006206  013704  000674              MOV     UNP,R4
2380  006212  005264  001072              INC     WTER1(R4)       ;BUMP WRITE ERROR
```

```
2381  006216  032777  000020  172362          BIT     #20,@SWR        ;SEE IF SHOULD RETRY
2382  006224  001436                          BEQ     WEX             ;IF NOT: BR
2383  006226  013703  000722                  MOV     ERSAV,R3
2384  006232  042703  102700                  BIC     #102700,R3      ;MASK UNRECOVERABLE ERROR
2385  006236  001410                          BEQ     WTM4            ;IF SO: BR
2386  006240  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2387  006244  012704  026671                  MOV     #MSG78,R4
2388  006250  104000                          TTOUTT                  ;PRINT UNRETRYABLE TAG
2389  006252  004737  011262                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE
2390  006256  000421                          BR      WEX
2391  006260  005037  000700          WTM4:   CLR     RPCNT           ;CLEAR REPEAT CNTR
2392  006264  013704  000674                  MOV     UNP,R4
2393  006270  005264  001052                  INC     RTY1(R4)        ;BUMP RETRY CNTR
2394  006274  005037  000702                  CLR     RTCNT           ;CLEAR RETRY CNTR
2395  006300  032777  002000  172300          BIT     #2000,@SWR      ;SEE IF PRINT ERRORS
2396  006306  001003                          BNE     WTM4A           ;IF NOT: BR
2397  006310  012704  026405                  MOV     #MSG64,R4
2398  006314  104000                          TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2399  006316  004737  006364          WTM4A:  JSR     PC,WRTY         ;GO DO RETRY
2400  006322  005037  000712          WEX:    CLR     RTYFL           ;CLEAR RETRY FLAG
2401  006326  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
2402  006332  005737  000660                  TST     EOTREC          ;**G BRANCH IF NOT AT EOT
2403  006336  100011                          BPL     WRWX            ;**G
2404  006340  017703  172242          WRW:    MOV     @SWR,R3
2405  006344  042703  177763                  BIC     #177763,R3
2406  006350  022703  000014                  CMP     #14,R3          ;SEE IF WRITE ONLY
2407  006354  001002                          BNE     WRWX            ;IF NOT: BR
2408  006356  000137  004426                  JMP     REOT            ;ELSE REWIND
2409  006362  000207          WRWX:   RTS     PC              ;EXIT
```

```
2410                                    ;**********************
2411                                    ;WRITE ERROR RETRY
2412                                    ;
2413                                    ;**********************
2414
2415  006364  012737  000001  000712  WRTY:   MOV     #1,RTYFL        ;SET RETRY FLAG
2416  006372  004737  006766          WRTY0:  JSR     PC,WRTSB        ;GO SPACE REVERSE FOR REPEAT
2417  006376  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
2418  006402  001003                          BNE     WRTYTM          ;IF SO: BR
2419  006404  004737  005544                  JSR     PC,WO           ;REWRITE RECORD
2420  006410  000402                          BR      WRTYR           ;GO ON
2421  006412  004737  006054          WRTYTM: JSR     PC,WTM          ;GO WRITE TAPE MARK AGAIN
2422  006416  005737  000706          WRTYR:  TST     SERFL           ;REWRITE GOOD
2423  006422  001024                          BNE     WRTY2           ;IF NOT: BR
2424  006424  005237  000700                  INC     RPCNT           ;BUMP REPEAT COUNTER
2425  006430  022737  000004  000700        CMP     #4,RPCNT        ;SEE IF FOUR GOOD REPEATS
2426  006436  001355                          BNE     WRTY0           ;IF NOT: REPEAT
2427  006440  032777  002000  172140        BIT     #2000,@SWR      ;SEE IF PRINT
2428  006446  001011                          BNE     WRTY1           ;IF NOT: BR
2429  006450  012704  027064                  MOV     #MSG105,R4
2430  006454  104000                          TTOUTT                  ;PRINT RECOVERED MESSAGE
2431  006456  012704  026427                  MOV     #MSG65,R4
2432  006462  104000                          TTOUTT                  ;PRINT RETRY TAG
2433  006464  013703  000702                  MOV     RTCNT,R3
2434  006470  104002                          OCTPP                   ;PRINT RETRY NUMBER
2435  006472  000207          WRTY1:  RTS     PC                      ;RESUME TESTING
2436  006474  005037  000646          WRTY2:  CLR     TEMP3           ;**G CLEAR RECOVERABLE ERROR FLAG
2437  006500  013703  000722                  MOV     ERSAV,R3        ;GET ER
2438  006504  042703  102700                  BIC     #102700,R3      ;MASK RECOVERABLE BITS
2439  006510  001413                          BEQ     WRTY2A          ;IF RECOVERABLE: BR
2440  006512  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2441  006516  012704  026671                  MOV     #MSG78,R4
2442  006522  104000                          TTOUTT                  ;PRINT NON-RECOVERABLE MSG
2443  006524  004737  011262                  JSR     PC,NRTP         ;PRINT ER
2444  006530  012737  000001  000646        MOV     #1,TEMP3        ;SET FLAG
2445  006536  000407                          BR      WRTY2B
2446  006540  032777  002000  172040  WRTY2A: BIT     #2000,@SWR      ;SEE IF PRINT
2447  006546  001025                          BNE     WRTY3           ;IF NOT: BR
2448  006550  012704  027320                  MOV     #MSG110,R4
2449  006554  104000                          TTOUTT                  ;PRINT BAD TAPE SUSPECT
2450  006556  012704  026427          WRTY2B: MOV     #MSG65,R4
2451  006562  104000                          TTOUTT                  ;PRINT RETRY TAG
2452  006564  013703  000702                  MOV     RTCNT,R3
2453  006570  104002                          OCTPP                   ;PRINT RETRY NUMBER
2454  006572  012704  027342                  MOV     #MSG111,R4
2455  006576  104000                          TTOUTT                  ;PRINT REPEAT TAG
2456  006600  013703  000700                  MOV     RPCNT,R3
2457  006604  104002                          OCTPP                   ;PRINT REPEAT NUMBER
2458  006606  005737  000646                  TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
2459  006612  001403                          BEQ     WRTY3           ;IF NOT: BR
2460  006614  005037  000646                  CLR     TEMP3           ;CLEAR FLAG
2461  006620  000207                          RTS     PC              ;EXIT
2462  006622  005737  000702          WRTY3:  TST     RTCNT           ;SEE IF FIRST RETRY
2463  006626  001004                          BNE     WRTY3A          ;IF NOT: BR
2464  006630  013704  000674                  MOV     UNP,R4
2465  006634  005364  001072                  DEC     WTER1(R4)       ;DECREMENT WRITE ERROR CNTR
```

```
2466  006640  013704  000674          WRTY3A: MOV     UNP,R4                  ;GET UNIT NUMBER
2467  006644  016437  001032  000730          MOV     BTADDR(R4),BTPT ;GET ADDRESS OF UNIT BAD TAPE CNTR
2468  006652  017704  172052                  MOV     @BTPT,R4                ;GET COUNTER
2469  006656  005724                          TST     (R4)+                   ;SET POINTER OFFSET
2470  006660  010477  172044                  MOV     R4,@BTPT
2471  006664  013703  000730                  MOV     BTPT,R3
2472  006670  060304                          ADD     R3,R4                   ;SET ABSOLUTE POINTER
2473  006672  013714  000654                  MOV     BLCNTR,(R4)             ;SET BLOCK NUMBER
2474  006676  062704  000040                  ADD     #40,R4                  ;ADD RCNT OFFSET
2475  006702  013714  000554                  MOV     RCNT,(R4)
2476  006706  160014                          SUB     R0,(R4)                 ;SET RECORD NUMBER
2477  006710  005214                          INC     (R4)                    ;CORRECT RECORD NUMBER
2478  006712  022777  000040  172010          CMP     #40,@BTPT               ;SEE IF TOO MANY BAD SPOTS
2479  006720  001002                          BNE     WRTY4                   ;IF NOT: BR
2480  006722  000137  007162                  JMP     BTOV                    ;ELSE GO TO BAD TAPE OVERFLOW
2481  006726  005237  000702          WRTY4:  INC     RTCNT                   ;BUMP RETRY COUNTER
2482  006732  022737  000004  000702          CMP     #4,RTCNT                ;SEE IF DONE 4 RETRIES
2483  006740  001410                          BEQ     WRTY5                   ;IF SO: BR
2484  006742  013704  000674                  MOV     UNP,R4
2485  006746  005264  001052                  INC     RTY1(R4)                ;BUMP RETRY COUNTER
2486  006752  005237  000732                  INC     ERTFL                   ;SET ERASE FLAG
2487  006756  000137  006372                  JMP     WRTY0                   ;DO NEXT RETRY
2488  006762  000137  007402          WRTY5:  JMP     BTUR                    ;ELSE GO TO BAD TAPE UNRECOVERABLE
2489
2490                                  ;WRITE RETRY BACKSPACE-ERASE SUBROUTINE**********
2491
2492  006766  005037  000706          WRTSB:  CLR     SERFL                   ;CLEAR FLAG
2493  006772  013737  000576  000666          MOV     TSTAL,STAL
2494  007000  004737  012306                  JSR     PC,STALL                ;DO TURN AROUND DELAY
2495  007004  012737  026440  000652          MOV     #MSG66,EMADDR           ;SET ERROR CODE
2496  007012  012777  177777  171476          MOV     #-1,@FC                 ;SET TO BACKSPACE 1 RECORD
2497  007020  012777  033612  171466          MOV     #RDATA,@BA              ;SET BA
2498  007026  004737  012236                  JSR     PC,BKRT                 ;GO BACKSPACE
2499  007032  005737  000706                  TST     SERFL                   ;SEE IF ERROR
2500  007036  001406                          BEQ     WRTSB1                  ;IF NOT: BR
2501  007040  012737  000002  000724  WRTSB0: MOV     #2,BTFLG                ;SET FLAG
2502  007046  022626                          CMP     (SP)+,(SP)+             ;RESET STACK
2503  007050  000137  004426                  JMP     REOT                    ;GO REWIND AND REMOVE FROM TESTING
2504  007054  005737  000732          WRTSB1: TST     ERTFL                   ;SEE IF SHOULD ERASE
2505  007060  001001                          BNE     WRTSB2                  ;IF SO: BR
2506  007062  000207                          RTS     PC                      ;RETURN
2507  007064  005037  000732          WRTSB2: CLR     ERTFL                   ;CLEAR ERASE FLAG
2508  007070  005037  000700                  CLR     RPCNT                   ;CLEAR REPEAT CNTR
2509  007074  005037  000706                  CLR     SERFL                   ;CLEAR FLAG
2510  007100  012737  026453  000652          MOV     #MSG67,EMADDR           ;SET ERROR CODE
2511  007106  005077  171404                  CLR     @FC                     ;CLEAR FRAME COUNT
2512  007112  012737  000024  000672          MOV     #24,MTC1                ;SET ERASE OP-CODE
2513  007120  012777  027604  171366          MOV     #WDATA,@BA              ;SET BA
2514  007126  012737  007140  000662          MOV     #WRTSB3,RTRN            ;SET RETURN ADDRESS
2515  007134  000137  021220                  JMP     TAPG                    ;GO ERASE
2516  007140  012703  027604          WRTSB3: MOV     #WDATA,R3               ;SET EXPT BA
2517  007144  004737  017506                  JSR     PC,ER2                  ;GO CHECK ERRORS
2518  007150  005737  000706                  TST     SERFL                   ;SEE IF ERROR
2519  007154  001737                          BEQ     WRTSB1                  ;IF NOT: BR
2520  007156  000137  007040                  JMP     WRTSB0
2521
```

```
2522                                    ;BAD TAPE OVERFLOW SUBROUTINE**********
2523
2524  007162  005037  000712    BTOV:   CLR     RTYFL           ;CLEAR RETRY FLAG
2525  007166  012737  000001  000724    MOV     #1,BTFLG        ;SET BAD TAPE OVERFLOW FLAG
2526  007174  005726                    TST     (SP)+           ;*+G ADJUST STACK
2527  007176  000137  004426            JMP     REOT            ;GO REWIND AND REMOVE FROM TESTING
2528  007202  013701  000730    BTOV0:  MOV     BTPT,R1         ;SET TABLE POINTER
2529  007206  005721                    TST     (R1)+
2530  007210  005000                    CLR     R0
2531  007212  010003            BTOV1:  MOV     R0,R3
2532  007214  000241                    CLC
2533  007216  006003                    ROR     R3              ;R3=R3/2 FOR CORRECT NUMBER
2534  007220  104002                    OCTPP                   ;PRINT ENTRY NUMBER
2535  007222  012704  025174            MOV     #MSG13,R4
2536  007226  105724                    TSTB    (R4)+           ;SKIP CR/LF
2537  007230  104000                    TTOUTT                  ;PRINT BLOCK NUMBER TAG
2538  007232  011103                    MOV     (R1),R3
2539  007234  104002                    OCTPP                   ;PRINT BLOCK NUMBER
2540  007236  012704  025202            MOV     #MSG14,R4
2541  007242  104000                    TTOUTT                  ;PRINT RECORD NUMBER TAG
2542  007244  062701  000040            ADD     #40,R1          ;SET POINTER OFFSET FOR RECOED NUMBER
2543  007250  012103                    MOV     (R1)+,R3
2544  007252  104002                    OCTPP                   ;PRINT RECORD NUMBER
2545  007254  162701  000040            SUB     #40,R1          ;RESET POINTER FOR BLOCK NUMBER
2546  007260  005720                    TST     (R0)+
2547  007262  020077  171442            CMP     R0,@BTPT        ;SEE IF DONE
2548  007266  001404                    BEQ     BTOV2           ;IF SO: BR
2549  007270  012704  025525            MOV     #MSG28,R4
2550  007274  104000                    TTOUTT                  ;DO CR/LF
2551  007276  000745                    BR      BTOV1           ;CONTINUE
2552  007300  005737  000726    BTOV2:  TST     BTSTF           ;SEE IF STAT ONLY PRINT
2553  007304  001007                    BNE     BTOVX           ;IF SO: BR
2554  007306  012703  000041            MOV     #41,R3          ;SET SIZE OF TABLE
2555  007312  013704  000730            MOV     BTPT,R4         ;SET POINTER
2556  007316  005024            BTOV3:  CLR     (R4)+           ;CLEAR TABLE
2557  007320  005303                    DEC     R3              ;SEE IF DONE
2558  007322  001375                    BNE     BTOV3           ;IF NOT: BR
2559  007324  000207            BTOVX:  RTS     PC              ;RETURN
2560
```

```
2561
2562                                    ;BAD TAPE STATISTIC PRINT********
2563
2564  007326  012704  025525      BTPRT:  MOV     #MSG28,R4
2565  007332  104000                      TTOUTT                  ;DO CR/LF
2566  007334  013704  000674              MOV     UNP,R4
2567  007340  016437  001032  000730      MOV     BTADDR(R4),BTPT ;SET TABLE POINTER
2568  007346  017703  171356              MOV     @BTPT,R3
2569  007352  000241                      CLC
2570  007354  006003                      ROR     R3              ;CORRECT NUMBER
2571  007356  104002                      OCTPP                   ;PRINT NUMBER OF BAD SPOTS
2572  007360  012704  027354              MOV     #MSG112,R4
2573  007364  104000                      TTOUTT                  ;PRINT BAD TAPE TAG
2574  007366  005777  171336              TST     @BTPT           ;SEE IF ANY BAD SPOTS
2575  007372  001001                      BNE     BTPRT1          ;IF SO: BR
2576  007374  000207                      RTS     PC              ;ELSE RETURN
2577  007376  000137  007202      BTPRT1: JMP     BTOVO           ;PRINT STATS
2578
2579                                    ;BAD TAPE UNRECOVERABLE SUBROUTINE*********
2580
2581  007402  004737  022772      BTUR:   JSR     PC,PAPRT        ;PRINT HEADER
2582  007406  012704  027167              MOV     #MSG107,R4
2583  007412  104000                      TTOUTT                  ;PRINT UNRECOVERABLE BAD SPOT MSG
2584  007414  000207                      RTS     PC              ;RESUME TESTING
2585
```

```
                                ;*************************************************************
                                ;READ SEQUENCER:
                                ;
                                ;THIS ROUTINE IS USED TO DETERMINE THE SEQUENCE
                                ;IN WHICH READ TAPE OPERATIONS ARE TO BE PERFORMED.
                                ;THIS IS NECESSARY WHEN THE UNIT BEING TESTED IS
                                ;CAPABLE OF READING DATA IN BOTH THE FORWARD AND
                                ;REVERSE DIRECTIONS.  CONSOLE SWITCHES ONE (1), TWO (2),
                                ;AND THREE (3) ARE USED TO DETERMINE THE READ SEQUENCE.
                                ;CONSOLE SWITCH ONE (1) DETERMINES WHETHER TO READ
                                ;THE BLOCK OF DATA FORWARD FIRST OR REVERSE FIRST.
                                ;SWITCH TWO (2) DISALLOWS READING IN THE REVERSE
                                ;DIRECTION AND SWITCH THREE (3) DISALLOWS READING IN
                                ;THE FORWARD DIRECTION.
                                ;*************************************************************

007416  012737  000002  000562  RSEQ:  MOV   #2,RDCMD
007424  017704  171156                 MOV   @SWR,R4          ;READ SWITCHES
007430  042704  177763                 BIC   #177763,R4       ;MASK READ BITS
007434  005704                         TST   R4               ;SEE IF BOTH READS
007436  001004                         BNE   RSR              ;IF NOT: BR
007440  032777  000002  171140         BIT   #2,@SWR          ;SEE IF READ REVERSE FIRST
007446  001051                         BNE   RSFR             ;IF NOT: BR
007450  032777  000004  171130  RSR:   BIT   #4,@SWR          ;SEE IF SHOULD READ REVERSE
007456  001005                         BNE   RSF              ;IF NOT: BR
007460  012737  010000  000562         MOV   #10000,RDCMD     ;LOAD READ REVERSE COMMAND
007466  004737  007734                 JSR   PC,READ          ;GO READ REVERSE
007472  032777  000010  171106  RSF:   BIT   #10,@SWR         ;SEE IF SHOULD READ FORWARD
007500  001026                         BNE   RSEX             ;IF NOT: BR
007502  032737  010000  000562         BIT   #10000,RDCMD     ;SEE IF HAVE READ REVERSE
007510  001407                         BEQ   RSF0             ;IF NOT: BR
007512  013737  000576  000666         MOV   TSTAL,STAL
007520  004737  012306                 JSR   PC,STALL         ;DO READ STALL
007524  000137  007544                 JMP   RSF1
007530  032777  000001  171050  RSF0:  BIT   #1,@SWR          ;SEE IF WRITE
007536  001002                         BNE   RSF1             ;IF NOT: BR
007540  004737  012060                 JSR   PC,BKSP          ;GO BACKSPACE
007544  012737  000002  000562  RSF1:  MOV   #2,RDCMD        ;LOAD READ FORWARD COMMAND
007552  004737  007734                 JSR   PC,READ          ;GO READ
007556  005737  000660         RSEX:  TST   EOTREC           ;++G BRANCH IF NOT AT EOT
007562  100002                         BPL   1$               ;++G
007564  000137  004426                 JMP   REOT             ;++G ELSE GO REWIND
007570  000207                 1$:     RTS   PC               ;++G EXIT

007572  012737  010000  000562  RSFR:  MOV   #10000,RDCMD
007600  032777  000010  171000         BIT   #10,@SWR         ;SEE IF SHOULD READ FORWARD
007606  001013                         BNE   RSFR1            ;IF NOT: BR
007610  032777  000001  170770         BIT   #1,@SWR          ;SEE IF WRITE
007616  001002                         BNE   RSFR0            ;IF NOT: BR
007620  004737  012060                 JSR   PC,BKSP          ;GO BACKSPACE TO START
007624  012737  000002  000562  RSFR0: MOV   #2,RDCMD        ;LOAD READ FORWARD COMMAND
007632  004737  007734                 JSR   PC,READ          ;GO READ FORWARD
007636  032777  000004  170742  RSFR1: BIT   #4,@SWR          ;SEE IF SHOULD READ REVERSE
007644  001344                         BNE   RSEX             ;IF NOT: BR
007646  032737  010000  000562         BIT   #10000,RDCMD
007654  001005                         BNE   RSFR2            ;IF READ REVERSE: BR
```

```
 2642  007656  013737  000576  000666          MOV     TSTAL,STAL      ;DO READ STALL
 2643  007664  004737  012306                  JSR     PC,STALL
 2644  007670  012737  010000  000562  RSFR2:  MOV     #10000,RDCMD    ;LOAD READ REVERSE
 2645  007676  004737  007734                  JSR     PC,READ         ;GO READ REVERSE
 2646  007702  005737  000660                  TST     EOTREC          ;SEE IF AT END OF TAPE
 2647  007706  100011                          BPL     RSFRX           ;++G IF NOT: BR
 2648  007710  163737  000554  000660          SUB     RCNT,EOTREC
 2649  007716  005437  000660                  NEG     EOTREC          ;SET TO PROPER RECORD NUMBER
 2650  007722  005237  000660                  INC     EOTREC
 2651  007726  000137  004426                  JMP     REOT            ;ELSE GO TO REWIND
 2652  007732  000207                  RSFRX:  RTS     PC              ;EXIT
 2653
```

```
                                        ;*************************************************************
                                        ;READ ROUTINE:
                                        ;
                                        ;THIS ROUTINE PERFORMS THE READ OPERATION DETERMINED
                                        ;BY THE READ SEQUENCE ROUTINE ONE RECORD AT A TIME.
                                        ;AT THE END OF EACH READ OPERATION THE STATUS REGISTER
                                        ;IS SCANNED FOR EITHER END OF TAPE OR BEGINNING OF TAPE.
                                        ;IF EOT WAS REACHED, CONTROL WILL BE PASSED TO
                                        ;THE EOT SUBROUTINE TO REWIND THE UNIT AND FLAG IT
                                        ;UNAVAILABLE UNTIL ALL UNITS HAVE REACHED EOT.
                                        ;IF BOT WAS REACHED AN ERROR IS PRINTED AND THE
                                        ;PROGRAM WILL HALT.  TESTING MAY BE RESUMED BY PRESSING
                                        ;THE CONTINUE SWITCH.
                                        ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE
                                        ;READ ROUTINE EXPECTS THE FIRST RECORD OF A
                                        ;READ REVERSE TO BE A TM, AND THE LAST RECORD
                                        ;OF A READ FORWARD TO BE A TM.  REMEMBER
                                        ;THAT THE TM ADDS ONE (1) TO THE TOTAL NUMBER
                                        ;OF RECORDS IN A BLOCK.
                                        ;CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13) DETERMINE WHETHER
                                        ;OR NOT TO CHECK FOR STATUS ERRORS (11) OR DATA ERRORS (13),
                                        ;CONSOLE SWITCH FIVE (5) IS USED TO CAUSE A CONTINUOUS
                                        ;READ AND SPACE (FORWARD OR REVERSE) OF THE CURRENT
                                        ;RECORD ON TAPE (YOZZLE).
                                        ;*************************************************************

007734  013700  000554        READ:   MOV     RCNT,R0         ;LOAD REC CNTR
007740  005737  000660                TST     EOTREC          ;SEE IF EOT
007744  100013                        BPL     RDA             ;IF NOT: BR
007746  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ FORWARD
007754  001407                        BEQ     RDA             ;IF SO: BR
007756  042737  100000  000660        BIC     #100000,EOTREC  ;CLEAR FLAG
007764  013703  000660                MOV     EOTREC,R3       ;GET MODIFIED RECORD COUNT
007770  160300                        SUB     R3,R0           ;SET RECORD AT
007772  005200                        INC     R0              ;SET TO PROPER NUMBER OF RECORDS
007774  012737  025107  000652  RDA:  MOV     #MSG6,EMADDR    ;SET ERROR MSG ADDRESS
010002  005037  000676                CLR     TMFLG
010006  032737  010000  000562        BIT     #10000,RDCMD
010014  001406                        BEQ     RD0             ;IF READ FORWARD: BR
010016  005737  000564                TST     TMEX            ;SEE IF TM
010022  001403                        BEQ     RD0             ;IF NOT: BR
010024  005237  000676                INC     TMFLG           ;SET TM FLAG
010030  005200                        INC     R0
010032  013777  000556  170456  RD0:  MOV     FMCNT,@FC       ;LOAD CHAR CNTR
010040  012777  033612  170446        MOV     #RDATA,@BA      ;LOAD DATA ADDR
010046  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
010054  001417                        BEQ     RD1A            ;IF NOT: BR
010056  013703  000556                MOV     FMCNT,R3
010062  005103                        COM     R3
010064  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
010072  001402                        BEQ     RD1             ;IF NOT: BR
010074  000241                        CLC
010076  006003                        ROR     R3              ;R3 = FC/2
010100  060377  1704'0        RD1:    ADD     R3,@BA          ;SET REVERSE BUS ADDRESS
010104  012737  000076  000672        MOV     #76,MTC1        ;SET READ REVERSE
010112  000403                        BR      RD1B
```

```
2710  010114  012737  000070  000672  RD1A:   MOV     #70,MTC1        ;SET READ FORWARD
2711  010122  012737  010134  000662  RD1B:   MOV     #RD2,RTRN       ;SET INTERRUPT RETURN ADDRESS
2712  010130  000137  021220          RD1D:   JMP     TAPG            ;GO EXECUTE TAPE COMMAND
2713  010134  032737  010000  000562  RD2:    BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2714  010142  001024                          BNE     RD3             ;IF SO: BR
2715  010144  032777  000020  170350          BIT     #20,@DS
2716  010152  001404                          BEQ     RD2B            ;AWAIT SWDN
2717  010154  032777  000020  170340  RD2A:   BIT     #20,@DS
2718  010162  001374                          BNE     RD2A            ;AWAIT TUR
2719  010164  032777  002000  170330  RD2B:   BIT     #2000,@DS       ;SEE IF EOT
2720  010172  001410                          BEQ     RD3             ;IF NOT: BR
2721  010174  005737  000676                  TST     TMFLG           ;SEE IF TM
2722  010200  001005                          BNE     RD3             ;IF SO: BR
2723  010202  010037  000660                  MOV     R0,EOTREC
2724  010206  052737  100000  000660          BIS     #100000,EOTREC  ;SET EOT FLAG
2725  010214  032777  000002  170300  RD3:    BIT     #2,@DS          ;SEE IF AT LOAD POINT
2726  010222  001410                          BEQ     RD4             ;IF NOT: BR
2727  010224  004737  022772                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
2728  010230  012704  025306                  MOV     #MSG22,R4
2729  010234  104000                          TTOUTT                  ;PRINT BOT ERROR
2730  010236  104006                          STOPP
2731  010240  000137  003162                  JMP     STARTA          ;RESTART
2732  010244  032777  004000  170334  RD4:    BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
2733  010252  001121                          BNE     RD5             ;IF NOT: BR
2734  010254  005737  000676                  TST     TMFLG
2735  010260  001472                          BEQ     RD4B            ;IF NO TM EXPT: BR
2736  010262  032777  000004  170232          BIT     #4,@DS
2737  010270  001024                          BNE     RD4A            ;IF TM RECVD: BR
2738  010272  012737  033612  021134          MOV     #RDATA,CADER    ;SAVE EXPT BUS ADDRESS
2739  010300  012737  000002  021142          MOV     #2,DRVER        ;SET TM STATUS ERROR FLAG
2740  010306  004737  020236                  JSR     PC,ERPT         ;GO PRINT TM ERROR
2741  010312  013704  000674                  MOV     UNP,R4
2742  010316  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2743  010324  001403                          BEQ     1$              ;IF NOT: BR
2744  010326  005264  001152                  INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
2745  010332  000502                          BR      RD6
2746  010334  005264  001112          1$:     INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
2747  010340  000477                          BR      RD6
2748  010342  012703  033612          RD4A:   MOV     #RDATA,R3
2749  010346  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2750  010354  001007                          BNE     RD4A0           ;IF SO: BR
2751  010356  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
2752  010364  001025                          BNE     RD4A2           ;IF SO: BR
2753  010366  062703  000002                  ADD     #2,R3
2754  010372  000422                          BR      RD4A2
2755  010374  013704  000556          RD4A0:  MOV     FMCNT,R4
2756  010400  005104                          COM     R4
2757  010402  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2758  010410  001402                          BEQ     RD4A1           ;IF NOT: BR
2759  010412  000241                          CLC
2760  010414  006004                          ROR     R4              ;SET TO FC/2
2761  010416  060403          RD4A1:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2762  010420  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2763  010424  032737  002000  000552          BIT     #2000,UDES      ;SEE IF IN PE
2764  010432  001002                          BNE     RD4A2           ;IF SO: BR
2765  010434  162703  000002                  SUB     #2,R3
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 2766  010440  004737  017506          RD4A2:  JSR     PC,ER2
 2767  010444  000402                  RD4C    BR      RD4C
 2768  010446  004737  017410          RD4B:   JSR     PC,ERCHK        ;GO CHECK ERRORS
 2769  010452  005737  000706          RD4C:   TST     SERFL
 2770  010456  001417                  RD5     BEQ     RD5             ;IF NO ERROR: BR
 2771  010460  013704  000674                  MOV     UNP,R4
 2772  010464  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2773  010472  001003                  RD4D    BNE     RD4D            ;IF SO: BR
 2774  010474  005264  001112                  INC     RDER1(R4)       ;BUMP READ FORWARD ERROR
 2775  010500  000402                  RD4E    BR      RD4E
 2776  010502  005264  001152          RD4D:   INC     RDERR1(R4)      ;BUMP READ REVERSE ERROR
 2777  010506  004737  010710          RD4E:   JSR     PC,RDRTY        ;GO RETRY
 2778  010512  005037  000712                  CLR     RTYFL           ;CLEAR RETRY FLAG
 2779  010516  032777  020000  170062  RD5:    BIT     #20000,@SWR     ;SEE IF SHOULD DO DATA CHECK
 2780  010524  001005                  RD6     BNE     RD6             ;IF NOT; BR
 2781  010526  005737  000676                  TST     TMFLG
 2782  010532  001002                  RD6     BNE     RD6
 2783  010534  004737  015546                  JSR     PC,DCHK         ;GO CHECK DATA
 2784  010540  005037  000706          RD6:    CLR     SERFL           ;CLEAR STATUS ERROR FLAG
 2785  010544  004737  014354                  JSR     PC,DS3          ;CLEAR BUFFER
 2786  010550  032777  000040  170030        BIT     #40,@SWR        ;SEE IF SHOULD YOZZLE
 2787  010556  001402                  RD7     BEQ     RD7             ;IF NOT: BR
 2788  010560  004737  011276                  JSR     PC,YOZ          ;ELSE GO YOZZLE
 2789  010564  013737  000572  000666  RD7:    MOV     RSTAL,STAL      ;SET DELAY
 2790  010572  004737  012306                  JSR     PC,STALL        ;STALL
 2791  010576  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2792  010604  001403                  RD7A    BEQ     RD7A            ;IF NOT: BR
 2793  010606  005037  000676                  CLR     TMFLG           ;CLEAR TAPE MARK FLAG
 2794  010612  000405                  RD10    BR      RD10
 2795  010614  005737  000660          RD7A:   TST     EOTREC          ;SEE IF EOT FOUND
 2796  010620  100002                  RD10    BPL     RD10            ;IF NOT: BR
 2797  010622  012700  000001                  MOV     #1,R0           ;SET TO EOT
 2798  010626  005300                  RD10:   DEC     R0
 2799  010630  001402                  RD11    BEQ     RD11            ;IF DONE ALL: BR
 2800  010632  000137  010032                  JMP     RD0
 2801  010636  032737  010000  000562  RD11:   BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 2802  010644  001016                  RDEX    BNE     RDEX            ;IF SO: BR
 2803  010646  005737  000660                  TST     EOTREC          ;SEE IF FOUND EOT
 2804  010652  100413                  RDEX    BMI     RDEX            ;IF SO: BR
 2805  010654  005737  000564                  TST     TMEX            ;SEE IF TM EXPECTED
 2806  010660  001410                  RDEX    BEQ     RDEX            ;IF NOT: BR
 2807  010662  005737  000676                  TST     TMFLG           ;SEE IF TM FOUND
 2808  010666  001005                  RDEX    BNE     RDEX            ;IF SO: BR
 2809  010670  005237  000676                  INC     TMFLG           ;ELSE SET FLAG
 2810  010674  005200                  RDEX    INC     R0              ;SET RECORD COUNT TO ONE
 2811  010676  000137  010032                  JMP     RD0             ;GO READ TM
 2812  010702  005037  000676          RDEX:   CLR     TMFLG
 2813  010706  000207                  RDX:    RTS     PC              ;EXIT
```

```
2814                                    ;*********************************************************
2815                                    ;READ ERROR RETRY SUBROUTINE:
2816                                    ;
2817                                    ;THIS SUBROUTINE WILL RETRY ALL DATA RELATED
2818                                    ;READ ERRORS UP TO EIGHT (8) TIMES.  IF ALL
2819                                    ;FOUR RETRIES ARE BAD, IT IS CONSIDERED
2820                                    ;A HARD ERROR.  IF ANY ARE GOOD, IT IS A
2821                                    ;SOFT ERROR.  RETRIES MAY BE INHIBITED
2822                                    ;VIA SWITCH FOUR (SW4=0: INHIBIT RETRIES)
2823                                    ;*********************************************************
2824
2825  010710  032777  000020  167670  RDRTY:  BIT     #20,@SWR        ;SEE IF RETRY INHIBITED
2826  010716  001001                   BNE     RDRTO           ;IF NOT: BR
2827  010720  000207                   RTS     PC              ;ELSE RETURN
2828  010722  013703  000722          RDRTO:  MOV     ERSAV,R3
2829  010726  042703  102700                  BIC     #102700,R3      ;MARK NON-RECOVERABLE ERROR BITS
2830  010732  001410                   BEQ     RDRT1           ;IF NOT: BR
2831  010734  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2832  010740  012704  026732                  MOV     #MSG79,R4
2833  010744  104000                   TTOUTT                  ;PRINT NON-RECOVERABLE MESSAGE
2834  010746  004737  011262                  JSR     PC,NRTP         ;PRINT ER FOR NON-RETRYABLE ERROR
2835  010752  000207          RDRT1A: RTS     PC              ;RETURN
2836  010754  032777  002000  167624  RDRT1:  BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2837  010762  001003                   BNE     RDRT1B          ;IF SO: BR
2838  010764  012704  026405                  MOV     #MSG64,R4
2839  010770  104000                   TTOUTT                  ;PRINT ORIGINAL ERROR TAG
2840  010772  005037  000702          RDRT1B: CLR     RTCNT           ;CLEAR RETRY COUNTER
2841  010776  005037  000706          RDRTG:  CLR     SERFL           ;CLEAR STATUS ERROR FLAG
2842  011002  012737  000002  000712          MOV     #2,RTYFL        ;SET READ RETRY FLAG
2843  011010  004737  011276                  JSR     PC,YOZ          ;GO TO YOZZLE TO RETRY READ
2844  011014  005737  000706                  TST     SERFL           ;SEE IF RETRY ERROR
2845  011020  001031                   BNE     RDRT5           ;IF SO: BR
2846  011022  032777  002000  167556          BIT     #2000,@SWR
2847  011030  001011                   BNE     RDRT2
2848  011032  012704  027064                  MOV     #MSG105,R4
2849  011036  104000                   TTOUTT                  ;PRINT RECOVERED MESSAGE
2850  011040  012704  026427                  MOV     #MSG65,R4
2851  011044  104000                   TTOUTT                  ;PRINT RETRY TAG
2852  011046  013703  000702                  MOV     RTCNT,R3
2853  011052  104002                   OCTPP                   ;PRINT RETRY NUMBER
2854  011054  013704  000674          RDRT2:  MOV     UNP,R4
2855  011060  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2856  011066  001003                   BNE     RDRT3           ;IF SO: BR
2857  011070  005264  002672                  INC     RFSOFT(R4)      ;ELSO BUMP FORWARD SOFT ERROR COUNTER
2858  011074  000402                   BR      RDRT4
2859  011076  005264  002712          RDRT3:  INC     RRSOFT(R4)      ;BUMP ERRORS SOFT CNTR
2860  011102  000207          RDRT4:  RTS     PC              ;RETURN
2861  011104  005037  000646          RDRT5:  CLR     TEMP3           ;++G CLEAR RECOVERABLE ERROR INDICATOR
2862  011110  013703  000722                  MOV     ERSAV,R3        ;GET ER
2863  011114  042703  102700                  BIC     #102700,R3      ;MASK RECOVERABLE BITS
2864  011120  001413                   BEQ     RDRT5A          ;IF RECOVERABLE: BR
2865  011122  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
2866  011126  012704  026732                  MOV     #MSG79,R4
2867  011132  104000                   TTOUTT                  ;PRINT NON-RECOVERABLE MSG
2868  011134  004737  011262                  JSR     PC,NRTP         ;PRINT ER
2869  011140  012737  000001  000646          MOV     #1,TEMP3        ;SET FLAG
```

```
2870  011146  000404                          BR      RDRT5B
2871  011150  032777  002000  167430  RDRT5A: BIT     #2000,@SWR      ;SEE IF PRINT INHIBITED
2872  011156  001014                          BNE     RDRT6           ;IF SO: BR
2873  011160  012704  026427          RDRT5B: MOV     #MSG65,R4
2874  011164  104000                          TTOUTT                  ;PRINT RETRY TAG
2875  011166  013703  000702                  MOV     RTCNT,R3
2876  011172  104002                          OCTPP                   ;PRINT RETRY NUMBER
2877  011174  005737  000646                  TST     TEMP3           ;SEE IF DID NON-RECOVERABLE
2878  011200  001403                          BEQ     RDRT6           ;IF NOT: BR
2879  011202  005037  000646                  CLR     TEMP3           ;CLEAR FLAG
2880  011206  000207                          RTS     PC              ;EXIT
2881  011210  005237  000702          RDRT6:  INC     RTCNT
2882  011214  023737  000702  000602          CMP     RTCNT,RETRY     ;SEE IF DONE 8 RETRIES
2883  011222  001265                          BNE     RDRTG           ;IF NOT: BR
2884  011224  012704  027417                  MOV     #MSG115,R4
2885  011230  104000                          TTOUTT                  ;PRINT HARD ERROR MESSAGE
2886  011232  013704  000674                  MOV     UNP,R4
2887  011236  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
2888  011244  001003                          BNE     RDRT7           ;IF SO: BR
2889  011246  005264  002732                  INC     RFHARD(R4)      ;BUMP FORWARD HARD ERROR CNTR
2890  011252  000402                          BR      RDRTX
2891  011254  005264  002752          RDRT7:  INC     RRHARD(R4)      ;BUMP REVERSE HARD ERROR CNTR
2892  011260  000207                  RDRTX:  RTS     PC              ;RETURN
2893
2894  011262  013703  000722          NRTP:   MOV     ERSAV,R3        ;GET ER REGISTER
2895  011266  104002                          OCTPP                   ;PRINT ER
2896  011270  004737  021160                  JSR     PC,FRPRT        ;PRINT F OR R
2897  011274  000207                          RTS     PC              ;RETURN
```

```
                                        ;*************************************************************
                                        ;YOZZLE SUBROUTINE:
                                        ;
                                        ;THIS SUBROUTINE, ENTERED VIA SWITCH FIVE (5), IS USED TO PERFORM
                                        ;A CONTINUOUS READ AND SPACE OVER OF THE CURRENT RECORD ON TAPE.
                                        ;FULL STATUS AND DATA CHECKING MAY BE PERFORMED
                                        ;OR NOT VIA CONSOLE SWITCHES ELEVEN (11) AND THIRTEEN (13).
                                        ;A SOFTWARE DELAY IS PERFORMED BETWEEN EACH READ
                                        ;AND SPACE OPERATION AND MAY BE VARIED BY TYPING
                                        ;CNTRL C ON THE TTY AND ENTERING A VALUE IN RESPONSE
                                        ;TO THE PRINTED REQUEST.
                                        ;*************************************************************
011276  012777  000001  167304  YOZ:    MOV     #1,@TKS         ;SET TTY ENABLE
011304  013737  000600  000666          MOV     YSTAL,STAL
011312  004737  012306                  JSR     PC,STALL        ;DO YOZZLE STALL
011316  012777  177777  167172  YOZO:   MOV     #-1,@FC         ;SET TO 1 RECORD SPACING
011324  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011332  001404                          BEQ     YOZA            ;IF NOT: BR
011334  112737  000030  000672          MOVB    #30,MTC1        ;SET TO SPACE FORWARD
011342  000403                          BR      YOZB
011344  112737  000032  000672  YOZA:   MOVB    #32,MTC1        ;SET TO SPACE REVERSE
011352  012737  011372  000662  YOZB:   MOV     #YOZC,RTRN      ;SET RETURN ADDRESS
011360  012737  177775  000666          MOV     #177775,STAL    ;SET TIME MULTIPLIER
011366  000137  021220                  JMP     TAPG            ;GO YOZZLE
011372  005737  000676          YOZC:   TST     TMFLG           ;SEE IF TM
011376  001404                          BEQ     1$              ;IF NOT: BR
011400  012737  040000  000666          MOV     #40000,STAL     ;SET TM STALL
011406  000403                          BR      2$
011410  013737  000600  000666  1$:     MOV     YSTAL,STAL
011416  004737  012306          2$:     JSR     PC,STALL        ;DO YOZZLE STALL
011422  012777  033612  167064          MOV     #RDATA,@BA      ;SET BUS ADDRESS
011430  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011436  001417                          BEQ     YOZC1           ;IF NOT: BR
011440  013703  000556                  MOV     FMCNT,R3
011444  005103                          COM     R3
011446  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
011454  001402                          BEQ     YOZCO           ;IF NOT: BR
011456  000241                          CLC
011460  006003                          ROR     R3              ;R3 = FC/2
011462  060377  167026          YOZCO:  ADD     R3,@BA          ;SET REVERSE BUS ADDRESS
011466  012737  000076  000672          MOV     #76,MTC1        ;SET READ REVERSE
011474  000403                          BR      YOZC2
011476  012737  000070  000672  YOZC1:  MOV     #70,MTC1        ;SET READ FORWARD
011504  013777  000556  167004  YOZC2:  MOV     FMCNT,@FC       ;SET CHARACTER COUNT
011512  012737  011524  000662          MOV     #YOZD,RTRN      ;SET RETURN ADDRESS
011520  000137  021220                  JMP     TAPG            ;GO READ
011524  032777  004000  167054  YOZD:   BIT     #4000,@SWR      ;SEE IF SHOULD CHECK ERRORS
011532  001051                          BNE     YOZE            ;IF NOT: BR
011534  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
011540  001444                          BEQ     YOZD1           ;IF NOT: BR
011542  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
011550  001426                          BEQ     YOZDO           ;IF NOT: BR
011552  012703  033612                  MOV     #RDATA,R3
011556  013704  000556                  MOV     FMCNT,R4
011562  005104                          COM     R4
```

```
2954  011564  032737  000020  000552          BIT     #20,UDES        ;SEE IF CORE DUMP
2955  011572  001402                          BEQ     YOZD4           ;IF NOT: BR
2956  011574  000241                          CLC
2957  011576  006004                          ROR     R4              ;SET TO FC/2
2958  011600  060403                  YOZD4:  ADD     R4,R3           ;SET EXPT BUS ADDRESS
2959  011602  042703  000001                  BIC     #1,R3           ;MAKE EXPT ADDRESS EVEN
2960  011606  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2961  011614  001001                          BNE     YOZD2           ;IF SO: BR
2962  011616  005743                          TST     -(R3)           ;SET EXPT BA
2963  011620  004737  017506          YOZD2:  JSR     PC,ER2          ;GO CHECK ERRORS
2964  011624  000430                          BR      YOZF
2965  011626  012703  033612          YOZD0:  MOV     #RDATA,R3
2966  011632  032737  002000  000552          BIT     #2000,UDES      ;SEE IF PE
2967  011640  001001                          BNE     YOZD3           ;IF SO: BR
2968  011642  005723                          TST     (R3)+           ;SET EXPT BA
2969  011644  004737  017506          YOZD3:  JSR     PC,ER2          ;GO CHECK ERRORS
2970  011650  000416                          BR      YOZF
2971  011652  004737  017410          YOZD1:  JSR     PC,ERCHK        ;ELSE GO CHECK ERRORS
2972  011656  032777  020000  166722  YOZE:   BIT     #20000,@SWR     ;SEE IF SHOULD CHECK DATA
2973  011664  001010                          BNE     YOZF            ;IF NOT: BR
2974  011666  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK
2975  011672  001005                          BNE     YOZF            ;IF SO: BR
2976  011674  005737  000712                  TST     RTYFL           ;SEE IF RETRY
2977  011700  001004                          BNE     YOZFO           ;IF SO: BR
2978  011702  004737  015546                  JSR     PC,DCHK         ;ELSE GO CHECK DATA
2979  011706  004737  014354          YOZF:   JSR     PC,DS3          ;GO CLEAR DATA AREA
2980  011712  105777  166672          YOZFO:  TSTB    @TKS            ;SEE IF HAVE NEW STALL VALUE
2981  011716  100032                          BPL     YOZG            ;IF NOT: BR
2982  011720  122777  000203  166664          CMPB    #203,@TKB       ;SEE IF CONT C
2983  011726  001026                          BNE     YOZG            ;IF NOT: BR
2984  011730  012704  026107                  MOV     #MSG44,R4
2985  011734  104000                          TTOUTT                  ;PRINT YSTALL REQUEST
2986  011736  013703  000600                  MOV     YSTAL,R3
2987  011742  104002                          OCTPP                   ;PRINT PRESENT STALL
2988  011744  010037  000646                  MOV     R0,TEMP3        ;SAVE R0(REC CNT)
2989  011750  012705  000600                  MOV     #YSTAL,R5       ;SET ADDRESS OF YSTL
2990  011754  012701  000006                  MOV     #6,R1           ;SET NUMBER OF CHAR TO INPUT
2991  011760  012702  177777                  MOV     #-1,R2          ;SET MAXIMUM LIMIT
2992  011764  012703  002000                  MOV     #2000,R3        ;SET MINIMUM LIMIT
2993  011770  004737  023410                  JSR     PC,TTR          ;GO GET VALUE
2994  011774  013700  000646                  MOV     TEMP3,R0        ;RESTORE R0(REC CNTR)
2995  012000  000137  011276                  JMP     YOZ             ;RESTART YOZZLE
2996  012004  122777  000207  166600  YOZG:   CMPB    #207,@TKB       ;CHECK FOR CNTL G
2997  012012  001010                          BNE     YOZI
2998  012014  022737  000176  000606          CMP     #SWREG,SWR      ;IS SWREG SELECTED
2999  012022  001004                          BNE     YOZI
3000  012024  005077  166562                  CLR     @TKB            ;CLEAR CNTL G OUT OF BUFFER
3001  012030  004737  024572                  JSR     PC,CNTG         ;GO CHANGE SWREG
3002  012034  032777  000040  166544  YOZI:   BIT     #40,@SWR        ;SEE IF SHOULD CONTINUE YOZZLE
3003  012042  001402                          BEQ     YOZH            ;IF NOT: BR
3004  012044  000137  011316                  JMP     YOZO
3005  012050  012777  000100  166532  YOZH:   MOV     #100,@TKS       ;SET TTY INTERRUPT ENABLE
3006  012056  000207                          RTS     PC              ;EXIT
3007
```

```
3008
3009                                    ;*************************************************************
3010                                    ;BACKSPACE SUBROUTINE:
3011                                    ;
3012                                    ;THIS SUBROUTINE IS USED TO PERFORM THE
3013                                    ;BACKSPACE OPERATION REQUIRED BY THE READ
3014                                    ;ROUTINE FOR READ FORWARD AFTER WRITING.
3015                                    ;IF A TAPE MARK IS EXPECTED (TM=1) THEN THE SPACE
3016                                    ;ROUTINE ASSUMES THAT THE TM WILL BE FIRST WHEN
3017                                    ;BACKSPACING.  THEREFORE TWO OPERATIONS ARE REQUIRED
3018                                    ;TO SPACE OVER A BLOCK.  FIRST SPACE OVER THE TM, THEN
3019                                    ;SPACE OVER THE DATA RECORDS.
3020                                    ;A CHECK FOR RECORD COUNT ZERO IS MADE AT THE
3021                                    ;END OF THE SPACE OPERATION TO ASSURE THAT PROPER
3022                                    ;TAPE POSITIONING WAS DONE.
3023                                    ;*************************************************************
3024
3025  012060  013737  000576  000666  BKSP:  MOV     TSTAL,STAL
3026  012066  004737  012306                 JSR     PC,STALL        ;DO TURN AROUND STALL
3027  012072  012737  025137  000652         MOV     #MSG10,EMADDR
3028  012100  012777  033612  166406         MOV     #RDATA,@BA
3029  012106  005737  000564                 TST     TMEX            ;SEE IF TM
3030  012112  001440                         BEQ     BO              ;IF NOT: BR
3031  012114  012777  177777  166374         MOV     #-1,@FC
3032  012122  012737  000032  000672         MOV     #32,MTC1
3033  012130  012737  012142  000662         MOV     #BKTM,RTRN
3034  012136  000137  021220                 JMP     TAPG            ;SPACE TO TM
3035  012142  032777  010000  166436  BKTM:  BIT     #10000,@SWR     ;SEE IF SHOULD CHECK ERROR
3036  012150  001021                         BNE     BO              ;IF NOT: BR
3037  012152  012737  026321  000652         MOV     #MSG55,EMADDR
3038  012160  032777  000004  166334         BIT     #4,@DS          ;SEE IF TM
3039  012166  001006                         BNE     BKTMO           ;IF SO: BR
3040  012170  012737  033612  021134         MOV     #RDATA,CADER
3041  012176  004737  020236                 JSR     PC,ERPT         ;PRINT ERROR
3042  012202  000404                         BR      BO
3043  012204  012703  033612          BKTMO: MOV     #RDATA,R3
3044  012210  004737  017506                 JSR     PC,ER2
3045  012214  013700  000554          BO:    MOV     RCNT,R0
3046  012220  005100                         COM     R0              ;BUILD SPACE AMOUNT
3047  012222  005200                         INC     R0
3048  012224  012737  025137  000652         MOV     #MSG10,EMADDR   ;SET ERROR MESG ADDRESS
3049  012232  010077  166260                 MOV     R0,@FC
3050  012236  012737  000032  000672  BKRT:  MOV     #32,MTC1        ;SET SPACE REVERSE
3051  012244  012737  012262  000662         MOV     #B1,RTRN        ;SET RETURN ADDRESS
3052  012252  010037  000666                 MOV     R0,STAL         ;SET INTERRUPT TIME MULTIPLIER
3053  012256  000137  021220                 JMP     TAPG            ;GO DO SPACE
3054  012262  012703  033612          B1:    MOV     #RDATA,R3
3055  012266  004737  017506                 JSR     PC,ER2
3056  012272  013737  000576  000666  B2:    MOV     TSTAL,STAL      ;DO STALL
3057  012300  004737  012306                 JSR     PC,STALL        ;STALL
3058  012304  000207                         RTS     PC              ;EXIT
3059
```

```
3060
3061                                    ;*********************************************************
3062                                    ;STALL ROUTINE:
3063                                    ;
3064                                    ;THIS ROUTINE IS USED TO PROVIDE SOFTWARE DELAYS
3065                                    ;DURING READ, WRITE, TURN AROUND, AND YOZZLE.
3066                                    ;THE DELAY TIMES MAY BE SET BY THE OPERATOR AT
3067                                    ;INITIAL START FROM 200(8) OR MAY BE MODIFIED
3068                                    ;AT ANY TIME BY ENTERING CNTRL C ON THE TTY AND
3069                                    ;INSERTING NEW VALUES IN RESPONSE TO THE REQUEST.
3070                                    ;THE READ STALL AND THE WRITE STALL ARE DELAYS
3071                                    ;EXECUTED BETWEEN EACH RECORD OF THE DATA BLOCK.
3072                                    ;THE TURN AROUND STALL IS EXECUTED EACH TIME
3073                                    ;THE DIRECTION OF TAPE MOVEMENT IS CHANGED AND
3074                                    ;ALSO EACH TIME THE TAPE OPERATION CHANGES FROM
3075                                    ;WRITE TO READ OR READ TO WRITE. THE YOZZLE
3076                                    ;STALL IS EXECUTED ONLY DURING THE YOZZLE ROUTINE.
3077                                    ;*********************************************************
3078
3079  012306  005337  000666    STALL:  DEC     STAL
3080  012312  001375                    BNE     STALL           ;DELAY
3081  012314  000207                    RTS     PC              ;EXIT
```

```
3082
3083                                    ;*********************************************************
3084                                    ;RANDOM CHARACTER COUNT GENERATOR:
3085                                    ;
3086                                    ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH
3087                                    ;SEVEN (7) IS USED TO GENERATE A RANDOM
3088                                    ;CHARACTER COUNT FOR EACH DATA BLOCK.
3089                                    ;ALL RECORDS WITHIN A GIVEN BLOCK WILL BE
3090                                    ;THE SAME, BUT EACH BLOCK WILL VARY.
3091                                    ;THE LIMITS ARE TWENTY (20) TO FOUR THOUSAND
3092                                    ;(4000) OCTAL CHARACTERS PER RECORD.
3093                                    ;*********************************************************
3094
3095  012316  012701  177760       CCNTR:  MOV     #-20,R1         ;SET HIGH LIMIT
3096  012322  012702  174000               MOV     #-4000,R2       ;SET LOW LIMIT
3097  012326  004737  023356               JSR     PC,RANG         ;GO GENERATE NUMBER
3098  012332  042737  000001  000626       BIC     #1,RANSAV
3099  012340  013737  000626  000556       MOV     RANSAV,FMCNT    ;SET CHAR COUNT
3100  012346  012737  177777  014410       MOV     #-1,PATS        ;PRESET DATA PATTERN
3101  012354  000207                       RTS     PC              ;EXIT
3102
3103                                    ;*********************************************************
3104                                    ;RANDOM RECORD COUNT GENERATOR:
3105                                    ;
3106                                    ;THIS ROUTINE ENTERED VIA CONSOLE SWITCH SIX (6)
3107                                    ;IS USED TO GENERATE A RANDOM NUMBER OF RECORDS
3108                                    ;FOR EACH BLOCK OF DATA.
3109                                    ;THE LIMITS ARE ONE (1) TO FIVE HUNDRED (500) OCTAL
3110                                    ;RECORDS PER BLOCK.
3111                                    ;*********************************************************
3112
3113  012356  012702  000001       RCNTR:  MOV     #1,R2           ;SET LOW LIMIT
3114  012362  012701  000500               MOV     #500,R1         ;SET HIGH LIMIT
3115  012366  004737  023356               JSR     PC,RANG         ;GO GENERATE NUMBER
3116  012372  013737  000626  000554       MOV     RANSAV,RCNT     ;SET RECORD COUNT
3117  012400  000207                       RTS     PC              ;EXIT
3118
3119
```

```
3120
3121                            ;*************************************************************
3122                            ;TEST CONDITION ENTRY ROUTINE:
3123                            ;
3124                            ;THIS ROUTINE IS USED TO ALLOW THE OPERATOR
3125                            ;TO ENTER, AT THE TTY, THE NECESSARY PARAMETERS
3126                            ;TO RUN THE PROGRAM AS HE WISHES.  THE
3127                            ;ROUTINE IS ONLY ENTERED UPON INITIAL STARTING
3128                            ;FROM LOCATION 200(8).
3129                            ;THE MAIN PURPOSE OF THIS ROUTINE IS TO ESTABLISH
3130                            ;A TABLE OF DEVICES TO BE TESTED.  THIS TABLE
3131                            ;CONSISTS OF AN ENTRY FOR EACH OF ONE (1) TO
3132                            ;EIGHT (8) DEVICES.  EACH ENTRY CONTAINS THE
3133                            ;SLAVE NUMBER, DENSITY, PARITY, AND
3134                            ;FORMAT.  THE INFORMATION IS ENTERED
3135                            ;IN RESPONSE TO PRINTED REQUESTS AT THE TTY.
3136                            ;SLAVES MAY BE ENTERED IN ANY ORDER.  EACH
3137                            ;PARAMETER IS CHECKED FOR LEGALITY BEFORE BEING
3138                            ;SET INTO THE TABLE.
3139                            ;THE DRIVE NUMBER REQUEST WILL ALSO CHECK THE MASSBUS
3140                            ;FOR THE PRESENCE OF THE REQUESTED DRIVE.  IF IT IS NOT FOUND,
3141                            ;A NON-EXIST DRIVE MESSAGE WILL BE PRINTED AND ANOTHER DRIVE
3142                            ;REQUEST MADE.  WHEN THE DRIVE IS FOUND, THE RESPONSE IS STORED
3143                            ;AND CONTROL PASSED TO THE SLAVE SELECT ROUTINE.
3144                            ;THE SLAVE SELECT ROUTINE ALSO CHECKS FOR THE PRESENCE OF THE
3145                            ;SLAVE.  IF IT IS NOT PRESENT, A MESSAGE IS PRINTED AND ANOTHER
3146                            ;REQUEST IS ISSUED.  WHEN THE SELECTED SLAVE IS FOUND TO BE
3147                            ;PRESENT, A MESSAGE IS PRINTED IF IT IS A 7 CHANNEL DRIVE
3146                            ;TO ASSIST IN SELECTING DENSITY, PARITY, AND FORMAT.
3149                            ;UPON COMPLETION OF THE DEVICE TABLE, REQUESTS
3150                            ;ARE PRINTED FOR ENTRY OF THE NUMBER OF CHARACTERS
3151                            ;PER RECORD AND THE NUMBER OF RECORDS PER BLOCK.  THE
3152                            ;NEXT REQUEST IS FOR A PATTERN NUMBER TO BE USED
3153                            ;FOR WRITING AND CHECKING OF READ DATA.
3154                            ;FOLLOWING THE PATTERN REQUEST IS THE TAPE MARK OPTION.
3155                            ;RESPONDING TO THE REQUEST (TM=) WITH A ONE (1)
3156                            ;WILL CAUSE THE PROGRAM TO WRITE A TM AT THE
3157                            ;END OF EACH DATA BLOCK AND TO EXPECT THE
3158                            ;TM TO BE DETECTED IN EITHER READ FORWARD AND REVERSE
3159                            ;OR DURING SPACE OPERATION.  A RESPONSE OF ZERO (TM=0)
3160                            ;DISALLOWS WRITTING OF THE TM AND CAUSES THE READ
3161                            ;AND SPACE ROUTINES TO EXPECT NO TM TO BE PRESENT.
3162                            ;THE LAST REQUESTS ARE FOR ENTRY OF THE DESIRED
3163                            ;WRITE, READ, AND TURN AROUND STALLS.
3164                            ;*************************************************************
3165
3166  012402  005737  000634   TINP:   TST     TINF            ;SEE IF SHOULD INPUT FROM TTY
3167  012406  001001           BNE     TINPA           ;IF SO: BR
3168  012410  000207           RTS     PC              ;EXIT
3169  012412  005037  000674   TINPA:  CLR     UNP             ;CLEAR TABLE POINTER
3170  012416  005037  005160           CLR     REOTC           ;CLEAR EOT UNIT COUNTER
3171  012422  012700  000010           MOV     #10,R0          ;SET SIZE OF TABLE
3172  012426  012701  000750           MOV     #UN1,R1         ;SET START OF TABLE
3173  012432  005021           TINPB:  CLR     (R1)+           ;CLEAR TABLE
3174  012434  005300           DEC     R0              ;SEE IF DONE
3175  012436  001375           BNE     TINPB           ;IF NOT: BR
```

```
3176  012440  012704  025601                    MOV     #MSG31,R4
3177  012444  005737  000734                    TST     ASEQF           ;SEE IF AUTO SEQ
3178  012450  001402                            BEQ     TINPB1          ;IF NOT: BR
3179  012452  012704  025527                    MOV     #MSG30,R4       ;SET AUTO SEQ HDR
3180  012456  104000                  TINPB1:   TTOUTT                  ;PRINT PROGRAM NAME
3181  012460  005737  014152                    TST     SCVFL           ;SEE IF SHORT CONVERSATION
3182  012464  001067                            BNE     TINPC           ;IF SO: BR
3183  012466  012704  026611                    MOV     #MSG74,R4
3184  012472  104000                            TTOUTT                  ;REQUEST STARTING REGISTER ADDRESS
3185  012474  013703  000544                    MOV     REGS,R3
3186  012500  104002                            OCTPP                   ;PRINT CURRENT REG START
3187  012502  012705  000544                    MOV     #REGS,R5        ;SAVE ADDRESS LOCATION
3188  012506  012701  000006                    MOV     #6,R1           ;SET SIZE OF ENTRY
3189  012512  012702  176400                    MOV     #176400,R2      ;SET UPPER LIMIT
3190  012516  012703  172300                    MOV     #172300,R3      ;SET LOWER LIMIT
3191  012522  004737  023410                    JSR     PC,TTR          ;GO GET RESPONSE
3192  012526  012704  026634                    MOV     #MSG75,R4
3193  012532  104000                            TTOUTT                  ;GO REQUEST VECTOR ADDRESS
3194  012534  013703  000546                    MOV     VECT,R3
3195  012540  104002                            OCTPP                   ;PRINT CURRENT VECTOR
3196  012542  012705  000546                    MOV     #VECT,R5        ;SET SAVE LOCATION
3197  012546  012701  000003                    MOV     #3,R1           ;SET SIZE OF ENTRY
3198  012552  012702  000224                    MOV     #224,R2         ;SET UPPER LIMIT
3199  012556  012703  000150                    MOV     #150,R3         ;SET LOWER LIMIT
3200  012562  004737  023410                    JSR     PC,TTR          ;GO GET RESPONSE
3201  012566  013700  000546                    MOV     VECT,R0         ;GET VECTOR ADDRESS
3202  012572  012720  021750                    MOV     #MTINT,(R0)+    ;LOAD VECTOR WITH HANDLER ADDRESS
3203  012576  012710  000340                    MOV     #340,(R0)       ;LOAD PRIORITY LEVEL
3204  012602  013700  000544                    MOV     REGS,R0         ;GET STARTING REGISTER ADDRESS
3205  012606  012701  000016                    MOV     #16,R1          ;SET NUMBER OF REGISTERS
3206  012612  012702  000510                    MOV     #C1,R2          ;GET FIRST ADDRESS LOCATION
3207  012616  010022                  TINPB0:   MOV     R0,(R2)+        ;BUILD TABLE OF ADDRESSES
3208  012620  062700  000002                    ADD     #2,R0           ;BUMP ADDRESS
3209  012624  005301                            DEC     R1              ;SEE IF DONE
3210  012626  001373                            BNE     TINPB0          ;IF NOT: BR
3211  012630  005737  000734                    TST     ASEQF           ;SEE IF AUTO SEQ
3212  012634  001403                            BEQ     TINPC           ;IF NOT: BR
3213  012636  005726                            TST     (SP)+           ;RESET STACK POINTER
3214  012640  000137  021766                    JMP     ASEQ            ;GO TO AUTO SEQUENCE
3215  012644  012777  000040  165646  TINPC:    MOV     #40,@CS         ;INITIALIZE
3216  012652  012704  026255                    MOV     #MSG52,R4
3217  012656  104000                            TTOUTT                  ;REQUEST DRIVE NUMBER
3218  012660  012705  000550                    MOV     #DVN,R5         ;GET ADDRESS
3219  012664  012701  000001                    MOV     #1,R1           ;SET SIZE OF RESPONSE
3220  012670  012702  000007                    MOV     #7,R2           ;SET UPPER LIMIT
3221  012674  012703  000000                    MOV     #0,R3           ;SET LOWER LIMIT
3222  012700  004737  023410                    JSR     PC,TTR          ;GO GET DRIVE NUMBER
3223  012704  013777  000550  165606            MOV     DVN,@CS
3224  012712  005777  165572                    TST     @C1             ;ACCESS DRIVE
3225  012716  032777  010000  165574            BIT     #10000,@CS      ;SEE IF NED
3226  012724  001411                            BEQ     TINPO           ;IF NOT: BR
3227  012726  012704  026546                    MOV     #MSG71,R4
3228  012732  104000                            TTOUTT                  ;PRINT NED
3229  012734  013704  000510                    MOV     C1,R4
3230  012740  005204                            INC     R4
3231  012742  152714  000100                    BISB    #100,(R4)       ;CLEAR TRE
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3232  012746  000736                      BR      TINPC           ;++G RETRY DVN
3233  012750  012704  025643      TINPO:   MOV     #MSG32,R4
3234  012754  104000                      TTOUTT                  ;PRINT UNIT NUMBER REQUEST
3235  012756  005037  000644              CLR     TEMP2           ;CLEAR BUFFER
3236  012762  012705  000644              MOV     #TEMP2,R5       ;SET UNIT DESCRIPTION BUFFER ADDRESS
3237  012766  012701  000001              MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3238  012772  012702  000007              MOV     #7,R2           ;SET MAXIMUM LIMIT
3239  012776  012703  000000              MOV     #0,R3           ;SET MINIMUM LIMIT
3240  013002  004737  023410              JSR     PC,TTR          ;GO GET UNIT NUMBER
3241  013006  005737  000642              TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3242  013012  001013                      BNE     TINPOB          ;IF SO: BR
3243  013014  005737  000674              TST     UNP             ;SEE IF FIRST ENTRY
3244  013020  001001                      BNE     TINPOA          ;IF NOT: BR
3245  013022  000752                      BR      TINPO           ;++G ELSE RETRY
3246  013024  013700  000674    TINPOA:   MOV     UNP,R0
3247  013030  012760  177777  000750      MOV     #-1,UN1(R0)     ;SET END UNIT TABLE
3248  013036  000137  013426              JMP     TINP2C          ;GO GET RECORD COUNT
3249  013042  013700  000674    TINPOB:   MOV     UNP,R0
3250  013046  042760  000007  000750      BIC     #7,UN1(R0)      ;CLEAR UNIT NUMBER
3251  013054  004737  014166              JSR     PC,TPOS1        ;GO LOAD UNIT NUMBER TO PROPER POSITION
3252  013060  012777  000040  165432      MOV     #40,@CS
3253  013066  013777  000550  165424      MOV     DVN,@CS
3254  013074  016077  000750  165440      MOV     UN1(R0),@C2     ;LOAD UNIT NUMBER
3255  013102  032777  002000  165426  TINPOC:BIT    #2000,@DT       ;SEE  IF SLAVE PRESENT
3256  013110  001005                      BNE     TINPOD          ;IF SO: BR
3257  013112  012704  026334              MOV     #MSG57,R4
3258  013116  104000                      TTOUTT                  ;PRINT NON-EXIST SLAVE
3259  013120  000137  012750              JMP     TINPO           ;REDO
3260  013124  022777  142011  165404  TINPOD: CMP     #142011,@DT     ;++G SEE IF 9TRK TM02,TU16/TE16
3261  013132  001406                      BEQ     TINPOE          ;IF SO: BR
3262  013134  012704  026230              MOV     #MSG50,R4       ;ILLEGAL DRIVE TYPE
3263  013140  104000                      TTOUTT                  ;GO PRINT
3264  013142  017703  165370              MOV     @DT,R3
3265  013146  104002                      OCTPP                   ;PRINT DRIVE TYPE REGISTER
3266  013150  012704  025131    TINPOE:   MOV     #MSG9,R4
3267  013154  104000                      TTOUTT                  ;PRINT SERIAL NUMBER TAG
3268  013156  017703  165356              MOV     @SN,R3
3269  013162  004737  024420              JSR     PC,SNPT         ;PRINT SERIAL NUMBER
3270  013166  012704  025664    TINP1:    MOV     #MSG33,R4
3271  013172  104000                      TTOUTT                  ;PRINT DENSITY REQUEST
3272  013174  005037  000644              CLR     TEMP2           ;CLEAR BUFFER
3273  013200  012701  000001              MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3274  013204  012702  000007              MOV     #7,R2           ;SET MAXIMUM LIMIT
3275  013210  012703  000000              MOV     #0,R3           ;SET MINIMUM LIMIT
3276  013214  004737  023410              JSR     PC,TTR          ;GO GET DENSITY
3277  013220  005737  000642              TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3278  013224  001407                      BEQ     TINP2           ;IF NOT: BR
3279  013226  042737  003400  000552      BIC     #3400,UDES      ;ELSE CLEAR OLD PARAMETER
3280  013234  012703  000010              MOV     #10,R3          ;SET POSITION FACTOR
3281  013240  004737  014154              JSR     PC,TPOS         ;GO LOAD DENSITY INTO PROPER POSITION
3282  013244  012704  025700    TINP2:    MOV     #MSG34,R4
3283  013250  104000                      TTOUTT                  ;PRINT PARITY REQUEST
3284  013252  005037  000644              CLR     TEMP2           ;CLR BUFFER
3285  013256  012701  000001              MOV     #1,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3286  013262  012702  000001              MOV     #1,R2           ;SET MAXIMUM LIMIT
3287  013266  012703  000000              MOV     #0,R3           ;SET MINIMUM LIMIT
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3288  013272  004737  023410                JSR     PC,TTR          ;GO INPUT PARITY
3289  013276  005737  000642                TST     TEMP1           ;SEE IF HAVE NEW PARAMETER
3290  013302  001407                        BEQ     TINP2A          ;IF NOT: BR
3291  013304  042737  000010  000552        BIC     #10,UDES        ;ELSE CLEAR OLD PARAMETER
3292  013312  012703  000003                MOV     #3,R3           ;SET POSITION FACTOR
3293  013316  004737  014154                JSR     PC,TPOS         ;GO LOAD PARITY TO PROPER POSITION
3294  013322  012704  026277        TINP2A: MOV     #MSG53,R4
3295  013326  104000                        TTOUTT                  ;REQUEST FORMAT
3296  013330  005037  000644                CLR     TEMP2
3297  013334  012701  000002                MOV     #2,R1
3298  013340  012702  000016                MOV     #16,R2
3299  013344  012703  000014                MOV     #14,R3
3300  013350  004737  023410                JSR     PC,TTR          ;GO GET FORMAT
3301  013354  005737  000642                TST     TEMP1           ;SEE IF NEW PARAMETER
3302  013360  001407                        BEQ     TINP2B          ;IF NOT: BR
3303  013362  042737  000170  000552        BIC     #170,UDES
3304  013370  012703  000004                MOV     #4,R3
3305  013374  004737  014154                JSR     PC,TPOS
3306  013400  005237  005160        TINP2B: INC     REOTC           ;BUMP EOT UNIT COUNTER
3307  013404  022737  000016  000674        CMP     #16,UNP         ;SEE IF DONE UNITS
3308  013412  001405                        BEQ     TINP2C          ;IF SO: BR
3309  013414  062737  000002  000674        ADD     #2,UNP          ;POINT TO NEXT UNIT
3310  013422  000137  012750                JMP     TINPO           ;ELSE LOOK FOR NEXT UNIT
3311  013426  005037  000674        TINP2C: CLR     UNP             ;CLEAR UNIT POINTER
3312  013432  013700  005160                MOV     REOTC,R0
3313  013436  000337  005160                SWAB    REOTC
3314  013442  110037  005160                MOVB    R0,REOTC        ;SET UNIT EOT COUNTER
3315  013446  012704  025713        TINP3:  MOV     #MSG35,R4
3316  013452  104000                        TTOUTT                  ;PRINT RECORD COUNT REQUEST
3317  013454  013703  000554                MOV     RCNT,R3
3318  013460  104002                        OCTPP                   ;PRINT RECORD COUNT
3319  013462  012705  000554                MOV     #RCNT,R5        ;SET RECORD COUNT ADDRESS
3320  013466  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3321  013472  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3322  013476  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3323  013502  004737  023410                JSR     PC,TTR          ;GO GET RECORD COUNT
3324  013506  013737  000554  000630        MOV     RCNT,RCSAV      ;SAVE RECORD COUNT
3325  013514  012704  025734                MOV     #MSG36,R4
3326  013520  104000                        TTOUTT                  ;PRINT CHARACTER COUNT REQUEST
3327  013522  005437  000556                NEG     FMCNT
3328  013526  013703  000556                MOV     FMCNT,R3
3329  013532  104002                        OCTPP                   ;PRINT CHAR COUNT
3330  013534  012705  000556                MOV     #FMCNT,R5       ;SET CHARACTER COUNT ADDRESS
3331  013540  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3332  013544  012702  004000                MOV     #4000,R2        ;SET MAXIMUM LIMIT
3333  013550  012703  000004                MOV     #4,R3           ;SET MINIMUM LIMIT
3334  013554  004737  023410                JSR     PC,TTR          ;GO GET CHARACTER COUNT
3335  013560  005437  000556                NEG     FMCNT           ;SET TO TWO'S COMPLIMENT
3336  013564  013737  000556  000632        MOV     FMCNT,FCSAV     ;SAVE FRAME COUNT
3337  013572  012704  025760                MOV     #MSG37,R4       ;PRINT PATTERN NUMBER REQUEST
3338  013576  104000                        TTOUTT
3339  013600  013703  000560                MOV     PATRN,R3
3340  013604  104002                        OCTPP                   ;PRINT PATTERN
3341  013606  005037  014556                CLR     DOFL            ;CLEAR EXTERNAL DATA FLAG
3342  013612  012705  000560                MOV     #PATRN,R5       ;SET PATTERN NUMBER ADDRESS
3343  013616  012701  000002                MOV     #2,R1           ;SET NUMBER OF CHARACTERS TO INPUT
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3344  013622  012702  000015                MOV     #15,R2          ;SET MAXIMUM LIMIT
3345  013626  012703  000000                MOV     #0,R3           ;SET MINIMUM LIMIT
3346  013632  004737  023410                JSR     PC,TTR          ;GO GET PATTERN NUMBER
3347  013636  012704  026474                MOV     #MSG69,R4
3348  013642  104000                        TTOUTT                  ;REQUEST TM
3349  013644  013703  000564                MOV     TMEX,R3
3350  013650  104002                        OCTPP                   ;PRINT CURRENT TM FLAG SETTING
3351  013652  012705  000564                MOV     #TMEX,R5        ;GET TM FLAG ADDRESS
3352  013656  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3353  013662  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
3354  013666  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3355  013672  004737  023410                JSR     PC,TTR          ;TM 1=YES
3356  013676  012704  025261                MOV     #MSG21,R4
3357  013702  104000                        TTOUTT                  ;REQUEST INTERCHANGE READ
3358  013704  013703  000566                MOV     INTRF,R3
3359  013710  104002                        OCTPP                   ;PRINT CURRENT SETTING
3360  013712  012705  000566                MOV     #INTRF,R5       ;GET FLAG ADDRESS
3361  013716  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3362  013722  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
3363  013726  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3364  013732  004737  023410                JSR     PC,TTR          ;GO GET RESPONSE
3365  013736  012704  026003                MOV     #MSG38,R4
3366  013742  104000                        TTOUTT                  ;REQUEST SINGLE PASS
3367  013744  013703  000570                MOV     SPFLG,R3
3368  013750  104002                        OCTPP                   ;PRINT CURRENT SETTING
3369  013752  012705  000570                MOV     #SPFLG,R5       ;SET ADDRESS OF FLAG
3370  013756  012701  000001                MOV     #1,R1           ;SET SIZE OF RESPONSE
3371  013762  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
3372  013766  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
3373  013772  004737  023410                JSR     PC,TTR          ;GO GET RESPONSE
3374  013776  005737  014152        TINP4:  TST     SCVFL           ;SEE IF SHORT CONVERSATION
3375  014002  001060                        BNE     TINPX           ;IF SO: BR
3376  014004  012704  026023                MOV     #MSG40,R4
3377  014010  104000                        TTOUTT                  ;PRINT READ STALL REQUEST
3378  014012  013703  000572                MOV     RSTAL,R3
3379  014016  104002                        OCTPP                   ;PRINT READ STALL
3380  014020  012705  000572                MOV     #RSTAL,R5       ;SET READ STALL ADDRESS
3381  014024  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3382  014030  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3383  014034  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3384  014040  004737  023410                JSR     PC,TTR          ;GO GET READ STALL
3385  014044  012704  026051                MOV     #MSG41,R4
3386  014050  104000                        TTOUTT                  ;PRINT WRITE STALL REQUEST
3387  014052  013703  000574                MOV     WSTAL,R3
3388  014056  104002                        OCTPP                   ;PRINT READ STALL
3389  014060  012705  000574                MOV     #WSTAL,R5       ;SET WRITE STALL ADDRESS
3390  014064  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
3391  014070  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3392  014074  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3393  014100  004737  023410                JSR     PC,TTR          ;GO GET WRITE STALL
3394  014104  012704  026063                MOV     #MSG42,R4
3395  014110  104000                        TTOUTT                  ;PRINT TURN AROUND STALL REQUEST
3396  014112  013703  000576                MOV     TSTAL,R3
3397  014116  104002                        OCTPP                   ;PRINT TA STALL
3398  014120  012705  000576                MOV     #TSTAL,R5       ;SET TURN AROUND STALL ADDRESS
3399  014124  012701  000006                MOV     #6,R1           ;SET NUMBER OF CHARACTERS TO INPUT
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3400  014130  012702  177777                MOV     #-1,R2          ;SET MAXIMUM LIMIT
3401  014134  012703  000001                MOV     #1,R3           ;SET MINIMUM LIMIT
3402  014140  004737  023410                JSR     PC,TTR          ;GO GET TURN AROUND STALL
3403  014144  005037  014152        TINPX:  CLR     SCVFL           ;CLEAR SHORT CONVERSATION FLAG
3404  014150  000207                        RTS     PC              ;EXIT
3405  014152  000000                SCVFL:  0                       ;SHORT CONVERSATION FLAG
3406
3407                                        ;UNIT DESCRIPTION POSITIONING SUBROUTINE**********
3408
3409  014154  000241                TPOS:   CLC
3410  014156  006137  000644                ROL     TEMP2           ;POSITION CHARACTER
3411  014162  005303                        DEC     R3              ;SEE IF DONE
3412  014164  001373                        BNE     TPOS            ;IF NOT: BR
3413  014166  013700  000674        TPOS1:  MOV     UNP,R0          ;LOAD UNIT POINTER
3414  014172  053760  000644  000750        BIS     TEMP2,UN1(R0)   ;LOAD CHARACTER INTO UN1(R0)
3415  014200  000207                        RTS     PC              ;EXIT
3416
```

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                                        ;*************************************************************
                                        ;DATA SETUP ROUTINE:
                                        ;
                                        ;THIS ROUTINE IS USED TO GENERATE INTO THE ENTIRE
                                        ;WRITE BUFFER (4000 OCTAL CHARACTERS) THE DATA PATTERN
                                        ;SELECTED BY THE OPERATOR.  THERE ARE 15 (8) FIXED
                                        ;DATA PATTERNS AVAILABLE AND ONE SELECTION (DATA PATTERN 0)
                                        ;WHICH WILL READ ANY PATTERN PRESENTED AT THE
                                        ;HIGH SPEED PAPER TAPE READER.  THIS TAPE MUST BE PREPARED
                                        ;BY USING THE PROGRAM CALLED DTC. (MAINDEC-11-DZTUF-A-D)
                                        ;RANDOM DATA MAY ALSO BE USED VIA CONSOLE
                                        ;SWITCH EIGHT (8).
                                        ;THIS ROUTINE IS ALSO USED TO CLEAR OUT THE
                                        ;READ BUFFER (4000 OCTAL CHARACTERS) BEFORE EACH
                                        ;RECORD IS READ.
                                        ;*************************************************************

014202  005737  015152          DSUP:   TST     RDFL            ;SEE IF DID RANDOM DATA
014206  001044                  DS1:    BNE     DS1             ;++G F SO BRANCH
014210  005737  000734          DS0:    TST     ASEQF           ;SEE IF AUTO SEQ
014214  001406                          BEQ     DS0C            ;IF NOT: BR
014216  005737  000560                  TST     PATRN           ;SEE IF AUTO RANDOM
014222  100003                          BPL     DS0C            ;IF NOT: BR
014224  004737  015104                  JSR     PC,DATR         ;ELSE GO GENERATE RANDOM DATA
014230  000207                          RTS     PC              ;RETURN
014232  023737  000560  014410  DS0C:   CMP     PATRN,PATS      ;SEE IF NEW PATTERN
014240  001014                          BNE     DS0A            ;IF SO: BR
014242  013703  000552                  MOV     UDES,R3         ;GET UNIT DESCRIPTION
014246  042703  177767                  BIC     #177767,R3      ;MASK EVEN PARITY
014252  023703  014412                  CMP     PARS,R3         ;SEE IF SAME AS LAST TIME
014256  001404                          BEQ     DS0B            ;IF SO: BR
014260  010337  014412                  MOV     R3,PARS         ;SAVE PARITY
014264  004737  015154                  JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
014270  000207                  DS0B:   RTS     PC
014272  012703  027604          DS0A:   MOV     #WDATA,R3       ;R3 = ADDRS OF WRITE BUFFER
014276  013701  000560                  MOV     PATRN,R1        ;R1 = PATTERN SELECTOR
014302  010137  014410                  MOV     R1,PATS
014306  062701  000001                  ADD     #1,R1           ;BUMP POINTER
014312  006301                          ASL     R1              ;++G MAKE PATTERN SELECTOR EVEN
014314  004771  002772                  JSR     PC,@DATBL(R1)   ;GO GENERATE PATTERN
014320  032777  010000  164210  DS1:    BIT     #10000,@DT      ;SEE IF 7 CH
014326  001410                          BEQ     DS2A            ;IF NOT: BR
014330  012702  002002                  MOV     #2002,R2        ;SET BUFFER SIZE
014334  012701  027604                  MOV     #WDATA,R1       ;SET START OF BUFFER
014340  042721  140300          DS2:    BIC     #140300,(R1)+   ;MASK FOR 7 CH
014344  005302                          DEC     R2              ;SEE IF DONE
014346  001374                          BNE     DS2             ;IF NOT: BR
014350  004737  015154          DS2A:   JSR     PC,CRCLRC       ;GO GENERATE EXPT CRC/LRC
014354  012702  002000          DS3:    MOV     #2000,R2        ;R2=BUFFER SIZE
014360  012701  033612                  MOV     #RDATA,R1       ;R1=READ DATA START
014364  005021                  DS4:    CLR     (R1)+           ;CLEAR BUFFER
014366  005302                          DEC     R2              ;SEE IF DONE ALL
014370  001375                          BNE     DS4             ;IF NOT: BR
014372  013737  000552  014412          MOV     UDES,PARS       ;GET UNIT DESCRIPTION
014400  042737  177767  014412          BIC     #177767,PARS    ;MASK PARITY
```

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3473  014406  000207                        RTS     PC              ;EXIT
3474  014410  177777                PATS:   -1                      ;PATTERN NUMBER SAVE
3475  014412  000000                PARS:   0
3476
3477                                        ;EXTERNAL DATA INPUT FROM H/S READER (256 CHARACTER MAXIMUM)
3478
3479  014414  005737  014556        DATO:   TST     DOFL            ;++G BRANCH IF EXTERNAL INPUT
3480  014420  001401                        BEQ     1$              ;++G
3481  014422  000207                        RTS     PC              ;++G RETURN
3482  014424  012737  000001  014556  1$:   MOV     #1,DOFL         ;SET EXTERNAL FLAG
3483  014432  005077  164164                CLR     @PRB            ;CLEAR READER BUFFER
3484  014436  005077  164156                CLR     @PRS            ;CLEAR READER STATUS
3485  014442  005037  000642                CLR     TEMP1           ;CLEAR FOR USE AS CHARACTER FLAG
3486  014446  052777  000001  164144  DATOA:  BIS     #1,@PRS         ;START READER
3487  014454  105777  164140        DATOB:  TSTB    @PRS            ;++G SEE IF DONE
3488  014460  100375                        BPL     DATOB           ;++B
3489  014462  005001                        CLR     R1              ;CLEAR SAVE LOCATION
3490  014464  117701  164132                MOVB    @PRB,R1         ;SAVE CHARACTER
3491  014470  005737  000642                TST     TEMP1           ;SEE IF HAVE FOUND START CHARACTER
3492  014474  001011                        BNE     DATOC           ;IF SO : BR
3493  014476  105701                        TSTB    R1              ;SEE IF CHARACTER IS 0
3494  014500  001762                        BEQ     DATOA           ;IF SO : BR
3495  014502  012737  000001  000642        MOV     #1,TEMP1        ;ELSE SET CHARACTER FOUND FLAG
3496  014510  010137  000644                MOV     R1,TEMP2        ;SAVE DATA SIZE
3497  014514  010102                        MOV     R1,R2           ;SAVE DATA SIZE
3498  014516  000753                        BR      DATOA           ;++G GO GET FIRST DATA CHAR
3499  014520  110123                DATOC:  MOVB    R1,(R3)+        ;LOAD BUFFER
3500  014522  005302                        DEC     R2              ;SEE IF READ ALL
3501  014524  001350                        BNE     DATOA           ;IF NOT : BR
3502  014526  012701  027604        DATOD:  MOV     #WDATA,R1       ;R1 = START OF WRITE BUFFER
3503  014532  013702  000644                MOV     TEMP2,R2        ;R2 = SIZE OF DATA FIELD
3504  014536  112123                DATOE:  MOVB    (R1)+,(R3)+     ;REPEAT LOAD OF DATA FIELD
3505  014540  022703  033612                CMP     #RDATA,R3       ;SEE IF DONE
3506  014544  003001                        BGT     DATOF           ;IF NOT: BR
3507  014546  000207                        RTS     PC              ;++G RETURN
3508  014550  005302                DATOF:  DEC     R2              ;SEE IF AT END OF DATA FIELD
3509  014552  001371                        BNE     DATOE           ;IF NOT : BR
3510  014554  000764                        BR      DATOD           ;++G ELSE RESTART FILL
3511  014556  000000                DOFL:   0                       ;EXTERNAL DATA FLAG=1 IF ALREADY DONE
3512
```

```
3513                                    ;ALL ONES**********
3514
3515  014560  012701  177777    DAT1:   MOV     #-1,R1          ;R1=DATA
3516  014564  012702  002002    DAT1A:  MOV     #2002,R2        ;R2=WORD COUNT +2
3517  014570  010123            DAT1B:  MOV     R1,(R3)+        ;LOAD BUFFER
3518  014572  005302                    DEC     R2              ;SEE IF DONE
3519  014574  001375                    BNE     DAT1B           ;IF NOT: BR
3520  014576  000207                    RTS     PC              ;++G RETURN
3521
3522                                    ;ALL ZEROS**********
3523
3524  014600  005001            DAT2:   CLR     R1              ;R1=DATA
3525  014602  000770                    BR      DAT1A           ;++G LOAD BUFFER
3526
3527                                    ;WALKING ONE**********
3528
3529  014604  012701  000001    DAT3:   MOV     #1,R1           ;R1=DATA
3530  014610  000241                    CLC
3531  014612  012702  004004    DAT3A:  MOV     #4004,R2        ;R2=CHARACTER COUNT+4
3532  014616  110123            DAT3B:  MOVB    R1,(R3)+        ;LOAD BUFFER
3533  014620  106101                    ROLB    R1              ;SET NEXT CHARACTER
3534  014622  005302                    DEC     R2              ;SEE IF DONE
3535  014624  001374                    BNE     DAT3B           ;IF NOT: BR
3536  014626  000207                    RTS     PC              ;++G RETURN
3537
3538                                    ;WALKING ZERO**********
3539
3540  014630  012701  000376    DAT4:   MOV     #376,R1         ;R1=START OF DATA
3541  014634  000261                    SEC
3542  014636  000765                    BR      DAT3A           ;++G LOAD BUFFER
3543
3544                                    ;ALTERNATING ONE/ZERO**********
3545
3546
3547  014640  012701  052525    DAT5:   MOV     #52525,R1       ;R1=DATA
3548  014644  000747                    BR      DAT1A           ;++G LOAD BUFFER
3549
3550                                    ;ALTERNATING ZERO/ONE**********
3551
3552  014646  012701  125252    DAT6:   MOV     #125252,R1      ;R1=DATA
3553  014652  000744                    BR      DAT1A           ;++G LOAD BUFFER
3554
3555                                    ;ONE/ZERO IN ALTERNATING WORDS**********
3556
3557  014654  012701  125252    DAT7:   MOV     #125252,R1      ;SET WORD 1
3558  014660  012702  052525            MOV     #52525,R2       ;SET WORD 2
3559  014664  012704  001002            MOV     #1002,R4        ;SET NUMBER OF ENTRIES
3560  014670  010123            DAT7A:  MOV     R1,(R3)+        ;LOAD WORD 1
3561  014672  010223                    MOV     R2,(R3)+        ;LOAD WORD 2
3562  014674  005304                    DEC     R4              ;SEE IF DONE
3563  014676  001374                    BNE     DAT7A           ;IF NOT: BR
3564  014700  000207                    RTS     PC              ;++G RETURN
3565
```

```
                                        ;WALKING ONE/ALL ONE IN ALTERNATING CHARS****

014702  012702  002002        DAT10:  MOV     #2002,R2        ;SET BUFFER SIZE
014706  012701  000001                MOV     #1,R1           ;SET WALK BASE
014712  000241                       CLC
014714  012713  177400        DAT10A: MOV     #177400,(R3)    ;LOAD ALL ONE BYTE
014720  050123                       BIS     R1,(R3)+        ;LOAD WALK BYTE
014722  106101                       ROLB    R1              ;WALK ONE
014724  005302                       DEC     R2
014726  001372                       BNE     DAT10A          ;DO FULL BUFFER
014730  000207                       RTS     PC              ;++G RETURN

                                        ;ALL BITS 0-377**********

014732  005001                DAT11:  CLR     R1              ;R1=STARTING DATA
014734  012702  004004                MOV     #4004,R2        ;R2=CHARACTER COUNT*4
014740  110123                DAT11A: MOVB    R1,(R3)+        ;LOAD BUFFER
014742  105201                       INCB    R1              ;BUMP DATA
014744  005302                       DEC     R2              ;SEE IF DONE
014746  001374                       BNE     DAT11A          ;IF NOT: BR
014750  000207                       RTS     PC              ;++G RETURN

                                        ;ALL BITS 377-0**********

014752  012701  000377        DAT12:  MOV     #377,R1         ;R1=STARTING DATA
014756  012702  004004                MOV     #4004,R2        ;R2=CHARACTER COUNT*4
014762  110123                DAT12A: MOVB    R1,(R3)+        ;LOAD BUFFER
014764  105301                       DECB    R1              ;BUMP DATA
014766  005302                       DEC     R2              ;SEE IF DONE
014770  001374                       BNE     DAT12A          ;IF NOT: BR
014772  000207                       RTS     PC              ;++G RETURN

                                        ;ALTERNATING CHARACTERS 0 AND 377**********

014774  012701  000377        DAT13:  MOV     #377,R1         ;R1 = DATA
015000  000137  014564                JMP     DAT1A           ;LOAD BUFFER

                                        ;WALKING ZERO/ALL ZERO IN ALTERNATING CHARS******

015004  012702  002002        DAT14:  MOV     #2002,R2        ;SET BUFFER SIZE
015010  012701  000376                MOV     #376,R1         ;SET WALK BASE
015014  000261                       SEC
015016  010113                DAT14A: MOV     R1,(R3)         ;LOAD WALK BYTE
015020  042723  177400                BIC     #177400,(R3)+   ;CLEAR HIGH BYTE
015024  106101                       ROLB    R1              ;WALK ZERO BIT
015026  005302                       DEC     R2
015030  001372                       BNE     DAT14A          ;FILL BUFFER
015032  000207                       RTS     PC              ;++G RETURN
```

```
3615                                        ;AUTO SEQUENCE PATTERN*********
3616
3617  015034  012702  000200        DAT15:  MOV     #200,R2         ;SET NUMBER OF ENTRIES
3618  015040  012701  015064        DAT15A: MOV     #APATS,R1       ;SET START OF PATTERN
3619  015044  012704  000010                MOV     #10,R4          ;SET SIZE OF PATTERN
3620  015050  012123                DAT15B: MOV     (R1)+,(R3)+     ;FILL BUFFER
3621  015052  005304                        DEC     R4              ;SEE IF DONE PATTERN
3622  015054  001375                        BNE     DAT15B          ;IF NOT: BR
3623  015056  005302                        DEC     R2              ;SEE IF DONE BUFER
3624  015060  001367                        BNE     DAT15A          ;IF NOT: BR
3625  015062  000207                        RTS     PC              ;++G RETURN
3626  015064  000000                APATS:  0
3627  015066  177400                        177400
3628  015070  000377                        377
3629  015072  000000                        0
3630  015074  177777                        -1
3631  015076  000377                        377
3632  015100  177400                        177400
3633  015102  177777                        -1
3634
3635                                        ;RANDOM DATA GENERATOR SUBROUTINE**********
3636
3637  015104  013704  000556        DATR:   MOV     FMCNT,R4        ;SET NUMBER OF FRAMES
3638  015110  012703  027604                MOV     #WDATA,R3       ;SET ADDRESS OF START OF BUFFER
3639  015114  012701  177777                MOV     #-1,R1          ;SET HIGH LIMIT
3640  015120  005002                        CLR     R2              ;SET LOW LIMIT
3641  015122  004737  023356        DATRO:  JSR     PC,RAN3         ;GO GENERATE NUMBER
3642  015126  013723  000626                MOV     RANSAV,(R3)+    ;LOAD BUFFER
3643  015132  005204                        INC     R4              ;SEE IF DONE WHOLE BUFFER
3644  015134  001372                        BNE     DATRO           ;IF NOT: BR
3645  015136  004737  014320                JSR     PC,DS1          ;GO CHECK FOR 7 CH
3646  015142  012737  000001  015152        MOV     #1,RDFL         ;SET RANDOM DATA FLAG
3647  015150  000207                        RTS     PC              ;EXIT
3648  015152  000000                RDFL:   0                       ;RANDOM DATA SELECT FLAG
```

```
3649
3650                                    ;*************************************************************
3651                                    ;CRC/LRC CHARACTER BUILD;
3652                                    ;
3653                                    ;THIS ROUTINE WILL CONSTRUCT AND SAVE THE EXPECTED
3654                                    ;CRC AND LRC CHARACTERS ACCORDING TO DATA AND
3655                                    ;RECORD SIZE IF OPERATING IN NRZ MODE
3656                                    ;*************************************************************
3657
3658  015154  013700  000556    CRCLRC: MOV     FMCNT,R0        ;SET RECORD SIZE
3659  015160  005400                    NEG     R0
3660  015162  012701  027604            MOV     #WDATA,R1       ;SET START OF BUFFER
3661  015166  005037  015536            CLR     XORS
3662  015172  111104            CL0:    MOVB    (R1),R4         ;GET CHARACTER
3663  015174  004737  015364            JSR     PC,CLP          ;GO GET PARITY OF CHARACTER
3664  015200  004737  015512            JSR     PC,XOR          ;XOR CHARACTER
3665  015204  000241                    CLC
3666  015206  006004                    ROR     R4              ;ROTATE 1 RIGHT
3667  015210  103014                    BCC     CL2             ;IF NO CARRY: BR
3668  015212  052704  000400            BIS     #400,R4         ;SET BIT NINE
3669  015216  000241                    CLC
3670  015220  010405            CL1:    MOV     R4,R5           ;SAVE CHARACTER
3671  015222  042705  177703            BIC     #177703,R5
3672  015226  005105                    COM     R5
3673  015230  042705  177703            BIC     #177703,R5
3674  015234  042704  000074            BIC     #74,R4
3675  015240  050504                    BIS     R5,R4           ;COMPLIMENT BITS 2,3,4,5
3676  015242  010437  015536    CL2:    MOV     R4,XORS
3677  015246  005300                    DEC     R0
3678  015250  001401                    BEQ     CLLAST          ;IF LAST CHARACTER: BR
3679  015252  000747                    BR      CL0             ;•••G GET NEXT
3680  015254  013704  015536    CLLAST: MOV     XORS,R4
3681  015260  005137  015536            COM     XORS
3682  015264  042737  177050  015536    BIC     #177050,XORS
3683  015272  042704  177727            BIC     #177727,R4      ;COMPLIMENT ALL BUT BITS 3&5
3684  015276  050437  015536            BIS     R4,XORS
3685  015302  013737  015536  015540    MOV     XORS,EXCRC      ;SAVE EXPECTED CRC
3686  015310  013700  000556            MOV     FMCNT,R0
3687  015314  005400                    NEG     R0
3688  015316  012701  027604            MOV     #WDATA,R1       ;DO EXPT LRC
3689  015322  005037  015536            CLR     XORS
3690  015326  111104            CL3:    MOVB    (R1),R4
3691  015330  004737  015364            JSR     PC,CLP          ;GET PARITY
3692  015334  004737  015512            JSR     PC,XOR          ;XOR CHARACTER
3693  015340  005300                    DEC     R0
3694  015342  001371                    BNE     CL3             ;DO ALL FOR LRC
3695  015344  013704  015540            MOV     EXCRC,R4
3696  015350  004737  015512            JSR     PC,XOR          ;XOR CRC TO DATA
3697  015354  013737  015536  015542    MOV     XORS,EXLRC      ;SAVE EXPT LRC
3698  015362  000207                    RTS     PC              ;RETURN
3699  015364  005704            CLP:    TST     R4              ;SEE IF 0 CHAR
3700  015366  001010                    BNE     CLPE            ;IF NOT: BR
3701  015370  032737  000010  000552    BIT     #10,UDES        ;SEE IF EVEN PARITY
3702  015376  001404                    BEQ     CLPE            ;IF NOT: BR
3703  015400  012704  000420            MOV     #420,R4         ;SET 0 CHAR EVEN PARITY
3704  015404  005201                    INC     R1              ;BUMP POINTER
```

```
3705  015406  000207                        RTS     PC              ;RETURN
3706  015410  005037  015544          CLPE: CLR     PARCNT          ;CLEAR BIT COUNTER
3707  015414  012703  000010                MOV     #10,R3          ;SET NUMBER OF BITS
3708  015420  032704  000001          CLP0: BIT     #1,R4           ;SEE IF ONE BIT
3709  015424  001402                        BEQ     CLP1            ;IF NOT: BR
3710  015426  005237  015544                INC     PARCNT          ;BUMP COUNTER
3711  015432  000241                  CLP1: CLC
3712  015434  006004                        ROR     R4              ;ROTATE TO NEXT BIT
3713  015436  005303                        DEC     R3
3714  015440  001367                        BNE     CLP0            ;CONTINUE FOR ALL BITS
3715  015442  112104                        MOVB    (R1)+,R4
3716  015444  042704  177400                BIC     #177400,R4
3717  015450  032737  000001  015544        BIT     #1,PARCNT       ;SEE IF ODD NUMBER OF ONE BITS
3718  015456  001005                        BNE     CLP2            ;IF SO: BR
3719  015460  032737  000010  000552        BIT     #10,UDES        ;SEE IF SHOULD BE EVEN PARITY
3720  015466  001406                        BEQ     CLP3            ;IF NOT: BR
3721  015470  000207                        RTS     PC              ;ELSE EXIT
3722  015472  032737  000010  000552  CLP2: BIT     #10,UDES        ;SEE IF SHOULD BE ODD PARITY
3723  015500  001001                        BNE     CLP3            ;IF NOT: BR
3724  015502  000207                        RTS     PC              ;ELSE EXIT
3725  015504  052704  000400          CLP3: BIS     #400,R4         ;SET PARITY BIT
3726  015510  000207                        RTS     PC
3727  015512  010446                  XOR:  MOV     R4,-(SP)
3728  015514  043716  015536                BIC     XORS,(SP)
3729  015520  040437  015536                BIC     R4,XORS         ;XOR SUBROUTINE: R4 WITH XORS
3730  015524  052637  015536                BIS     (SP)+,XORS
3731  015530  013704  015536                MOV     XORS,R4
3732  015534  000207                        RTS     PC
3733
3734  015536  000000          XORS:   0                       ;XOR SAVE
3735  015540  000000          EXCRC:  0                       ;EXPECTED CRC
3736  015542  000000          EXLRC:  0                       ;EXPECTED LRC
3737  015544  000000          PARCNT: 0                       ;PARITY COUNTER
3738
```

```
3739
3740                                    ;************************************************************
3741                                    ;DATA CHECK SUBROUTINE:
3742                                    ;
3743                                    ;THIS SUBROUTINE IS USED TO COMPARE EACH CHARACTER
3744                                    ;OF DATA READ FROM TAPE WITH THE EXPECTED CHARACTER.
3745                                    ;ANY ERROR DETECTED WILL CAUSE CONTROL TO BE
3746                                    ;PASSED TO AN ERROR PRINT SUBROUTINE AND A
3747                                    ;SUBROUTINE TO ACCUMULATE THE NUMBER OF BITS
3748                                    ;DROPPED AND PICKED UP FROM EACH CHARACTER.
3749                                    ;THE NUMBER OF READ ERRORS IS ALSO ACCUMULATED.
3750                                    ;DATA CHECKING MAY BE TERMINATED BY USE OF
3751                                    ;CONSOLE SWITCH THIRTEEN (13).
3752                                    ;************************************************************
3753
3754  015546  005037  000656        DCHK:   CLR     BBC             ;CLEAR BAD RECORD CNTR
3755  015552  005037  000704                CLR     DERFL           ;CLEAR DATA ERROR FLAG
3756  015556  013705  000556                MOV     FMCNT,R5        ;LOAD CHAR COUNT
3757  015562  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
3758  015570  001402                        BEQ     DCHKO           ;IF NOT: BR
3759  015572  000261                        SEC
3760  015574  006005                        ROR     R5              ;R5 = FC/2
3761  015576  012701  027604        DCHKO:  MOV     #WDATA,R1       ;SET WRITE DATA ADDR
3762  015602  012702  033612                MOV     #RDATA,R2       ;SET READ DATA ADDR
3763  015606  032737  000010  000552        BIT     #10,UDES        ;SEE IF EVEN PARITY
3764  015614  001430                        BEQ     DFOCO           ;IF NOT: BR
3765  015616  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP PARITY
3766  015624  001024                        BNE     DFOCO           ;IF SO: BR
3767  015626  032737  002000  000552        BIT     #2000,UDES      ;SEE IF PE MODE
3768  015634  001020                        BNE     DFOCO           ;IF SO: BR
3769  015636  105711                DFOF:   TSTB    (R1)            ;SEE IF 0 CHAR
3770  015640  001404                        BEQ     DFOD            ;IF SO: BR
3771  015642  005201                        INC     R1              ;BUMP POINTER
3772  015644  005205                DFOE:   INC     R5              ;SEE IF DONE
3773  015646  001373                        BNE     DFOF            ;IF NOT: BR
3774  015650  000406                        BR      DFOC            ;ELSE CONTINUE
3775  015652  112721  000020        DFOD:   MOVB    #20,(R1)+       ;SET 20 IN PLACE OF 0
3776  015656  012737  177777  014410        MOV     #-1,PATS        ;SET PATTERN GENERATE FLAG
3777  015664  000767                        BR      DFOE
3778  015666  013705  000556        DFOC:   MOV     FMCNT,R5        ;RESET CHAR CNT
3779  015672  012701  027604                MOV     #WDATA,R1       ;RESET DATA ADDRESS
3780  015676  032737  010000  000562 DFOCO: BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3781  015704  001462                        BEQ     DFO             ;IF NOT: BR
3782  015706  013704  000556        DFOB:   MOV     FMCNT,R4        ;GET FRAME COUNT
3783  015712  005404                        NEG     R4              ;SET TO WHOLE NUMBER
3784  015714  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
3785  015722  001402                        BEQ     DFOBO           ;IF NOT: BR
3786  015724  000241                        CLC
3787  015726  006004                        ROR     R4              ;SET TO FC/2
3788  015730  060401                DFOBO:  ADD     R4,R1           ;POINT TO START OF WRITE DATA
3789  015732  060402                        ADD     R4,R2           ;POINT TO START OF READ DATA
3790  015734  032737  000001  000556        BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
3791  015742  001401                        BEQ     DFOA            ;IF NOT: BR
3792  015744  105722                        TSTB    (R2)+           ;BUMP POINTER
3793  015746  032737  000020  000552 DFOA:  BIT     #20,UDES        ;SEE IF CORE DUMP
3794  015754  001431                        BEQ     DFOA4           ;IF NOT: BR
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3795  015756  000241                        CLC
3796  015760  132742  000001                BITB    #1,-(R2)        ;SEE IF BIT 0 = 1
3797  015764  001401                        BEQ     DF0A0           ;IF NOT: BR
3798  015766  000261                        SEC
3799  015770  106012                DF0A0:  RORB    (R2)
3800  015772  000241                        CLC
3801  015774  132712  000001                BITB    #1,(R2)
3802  016000  001401                        BEQ     DF0A1
3803  016002  000261                        SEC
3804  016004  106012                DF0A1:  RORB    (R2)            ;POSITION BITS FOR REVERSE CORE DUMP
3805  016006  000241                        CLC
3806  016010  132712  000001                BITB    #1,(R2)
3807  016014  001401                        BEQ     DF0A2
3808  016016  000261                        SEC
3809  016020  106012                DF0A2:  RORB    (R2)
3810  016022  000241                        CLC
3811  016024  132712  000001                BITB    #1,(R2)
3812  016030  001401                        BEQ     DF0A3
3813  016032  000261                        SEC
3814  016034  106012                DF0A3:  RORB    (R2)
3815  016036  005202                        INC     R2              ;RESET POINTER
3816  016040  124142                DF0A4:  CMPB    -(R1),-(R2)     ;TEST DATA CHARACTER
3817  016042  001010                        BNE     DF1             ;IF NOT GOOD: BR
3818  016044  105037  000656                CLRB    BBC             ;CLEAR BAD RECORD COUNTER
3819  016050  000411                        BR      DF2
3820  016052  122122                DF0:    CMPB    (R1)+,(R2)+     ;CHECK DATA
3821  016054  001003                        BNE     DF1             ;IF BAD: BR
3822  016056  105037  000656                CLRB    BBC             ;CLEAR BAD RECORD CNTR
3823  016062  000404                        BR      DF2
3824  016064  004737  016670        DF1:    JSR     PC,DRPKF        ;GO GET DROPS AND PICKS
3825  016070  004737  016162                JSR     PC,DERR         ;GO DO PRINT
3826  016074  005205                DF2:    INC     R5              ;BUMP CHAR CNTR
3827  016076  001405                        BEQ     DF3             ;IF DONE ALL: BR
3828  016100  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3829  016106  001761                        BEQ     DF0             ;IF NOT: BR
3830  016110  000716                        BR      DF0A            ;ELSE CONTINUE READ REV
3831  016112  005037  000664        DF3:    CLR     HDRFL           ;CLEAR HEADER FLAG
3832  016116  005737  000704                TST     DERFL           ;SEE IF HAD DATA ERROR
3833  016122  001416                        BEQ     DFX             ;IF NOT: BR
3834  016124  005737  000706                TST     SERFL
3835  016130  001013                        BNE     DFX             ;IF NOT DATA ERROR ONLY: BR
3836  016132  013704  000674                MOV     UNP,R4
3837  016136  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3838  016144  001003                        BNE     DF4             ;IF SO: BR
3839  016146  005264  001132                INC     DATER1(R4)      ;BUMP DATA ERROR FORWARD COUNTER
3840  016152  000402                        BR      DFX
3841  016154  005264  001172        DF4:    INC     DEREV1(R4)      ;BUMP REVERSE DATA ERROR
3842  016160  000207                DFX:    RTS     PC              ;EXIT
3843
```

```
3844
3845                                    ;************************************************************
3846                                    ;DATA ERROR SUBROUTINE:
3847                                    ;
3848                                    ;THIS SUBROUTINE IS USED TO PRINT OUT ANY
3849                                    ;ERRORS FOUND DURING THE DATA CHECK.
3850                                    ;EACH CHARACTER FOUND BAD WILL BE PRINTED
3851                                    ;IN BIT FORMAT ALONG WITH ITS EXPECTED CHARACTER.
3852                                    ;AN ERROR HEADER CONSISTING OF THE UNIT NUMBER,
3853                                    ;BLOCK NUMBER, RECORD NUMBER, SIZE OF RECORD, AND
3854                                    ;ERROR TYPE (READ FORWARD, READ REVERSE, WRITE, ETC)
3855                                    ;IS PRINTED ONLY ONCE FOR EACH RECORD FOUND BAD.
3856                                    ;A COUNT IS MADE OF THE NUMBER OF SUCCESSIVE BAD
3857                                    ;CHARACTERS, AND IF TEN (10) SUCCESSIVE BAD CHARACTERS
3858                                    ;ARE FOUND IN A SINGLE RECORD, A MESSAGE INDICATING
3859                                    ;A BAD RECORD CONDITION IS PRINTED AND THE NEXT
3860                                    ;TWENTY (20) CHARACTERS ARE SKIPPED BEFORE CHECKING
3861                                    ;IS RESUMED.  IF THE BAD RECORD CONDITION IS FOUND
3862                                    ;THREE TIMES IN A RECORD, ALL REMAINING DATA IS
3863                                    ;SKIPPED EXCEPT THE FINAL TEN (10) CHARACTERS.
3864                                    ;THIS SKIPPING IS OF COURSE ONLY POSSIBLE IN
3865                                    ;RECORDS WHICH CONTAIN A SUFFICIENT NUMBER OF CHARACTERS.
3866                                    ;PRINTING OF ERRORS MAY BE DISALLOWED AT ANY TIME
3867                                    ;BY SETTING CONSOLE SWITCH TEN (10) TO A ONE.
3868                                    ;THE OPERATOR MAY CAUSE THE PROGRAM TO HALT ON ANY ERROR
3869                                    ;BY SETTING CONSOLE SWITCH FIFTEEN (15) TO A ONE.
3870                                    ;************************************************************
3871
3872  016162  032777  002000  162416  DERR:   BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
3873  016170  001067                   BNE     DERR4           ;++G BRANCH IF NOT
3874  016172  005237  000670          DERRO:  INC     PFLG            ;SET PRINT FLAG
3875  016176  005737  000664                  TST     HDRFL           ;SEE IF HAVE PRINTED HEADER
3876  016202  001007                   BNE     DERROA          ;IF SO: BR
3877  016204  004737  022772                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
3878  016210  012704  025056                  MOV     #MSG1,R4        ;LOAD ERROR MSG ADDR
3879  016214  104000                   TTOUTT                  ;PRINT ERROR
3880  016216  004737  021160                  JSR     PC,FRPRT        ;PRINT F OR R
3881  016222  012704  025075          DERROA: MOV     #MSG4,R4
3882  016226  104000                   TTOUTT                  ;PRINT CHAR NO. HEADER
3883  016230  010203                   MOV     R2,R3
3884  016232  162703  033612                  SUB     #RDATA,R3       ;POINT TO CHAR
3885  016236  005303                   DEC     R3
3886  016240  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3887  016246  001402                   BEQ     DERROB          ;IF NOT: BR
3888  016250  010503                   MOV     R5,R3           ;GET CHAR NUMBER
3889  016252  005103                   COM     R3
3890  016254  104002          DERROB: OCTPP                   ;PRINT CHAR NUMBER
3891  016256  012704  025063                  MOV     #MSG2,R4
3892  016262  104000                   TTOUTT                  ;PRINT EXPECTED DATA
3893  016264  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3894  016272  001402                   BEQ     DERROC          ;IF NOT: BR
3895  016274  111103                   MOVB    (R1),R3         ;GET CHAR
3896  016276  000401                   BR      DERROD
3897  016300  114103          DERROC: MOVB    -(R1),R3        ;LOAD EXPECTED DATA
3898  016302  004737  024306  DERROD: JSR     PC,DOUT         ;GO PRINT CHAR
3899  016306  012704  025070          MOV     #MSG3,R4
```

```
3900  016312  104000                        TTOUTT                  ;PRINT RECIEVED DATA
3901  016314  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3902  016322  001402                        BEQ     DERR1           ;IF NOT: BR
3903  016324  111203                        MOVB    (R2),R3         ;GET CHAR
3904  016326  000401                        BR      DERR2
3905  016330  114203              DERR1:    MOVB    -(R2),R3
3906  016332  004737  024306      DERR2:    JSR     PC,DOUT         ;PRINT BAD CHAR
3907  016336  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3908  016344  001001                        BNE     DERR4           ;**G BRANCH IF NOT
3909  016346  122122              DERR3:    CMPB    (R1)+,(R2)+     ;RESET POINTERS
3910  016350  105237  000656      DERR4:    INCB    BBC             ;BUMP BAD RECORD CNTR
3911  016354  122737  000010  000656        CMPB    #10,BBC         ;SEE IF BLD BTH
3912  016362  001120                        BNE     DEREX           ;IF NOT: BR
3913  016364  032777  002000  162214        BIT     #2000,@SWR      ;SEE IF PRINT INHIBIT
3914  016372  001003                        BNE     1$              ;IF SO: BR
3915  016374  012704  025207                MOV     #MSG15,R4
3916  016400  104000                        TTOUTT                  ;PRINT BLD BTH
3917  016402  105037  000656      1$:       CLRB    BBC             ;RESET BAD RECORD CNTR
3918  016406  000337  000656                SWAB    BBC             ;POSITION BLD BTH AMOUNT
3919  016412  105237  000656                INCB    BBC             ;BUMP AMOUNT
3920  016416  122737  000003  000656        CMPB    #3,BBC          ;SEE IF HAD 3 BLD BTHS
3921  016424  101052                        BHI     DERR4B          ;IF NOT: BR
3922  016426  000337  000656                SWAB    BBC             ;REPOSITION BBC
3923  016432  022705  177767                CMP     #177767,R5      ;SEE IF ON LAST EIGHT CHARS
3924  016436  101470                        BLOS    DERR6           ;IF SO: BR
3925  016440  012705  177767                MOV     #177767,R5      ;SET CHAR CNTR TO 8
3926  016444  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3927  016452  001416                        BEQ     DERR4A          ;IF NOT: BR
3928  016454  012701  027604                MOV     #WDATA,R1       ;GET START OF BUFFER
3929  016460  012702  033612                MOV     #RDATA,R2       ;GET START OF BUFFER
3930  016464  062701  000010                ADD     #10,R1
3931  016470  062702  000010                ADD     #10,R2          ;POINT TO START +10
3932  016474  032737  000001  000556        BIT     #1,FMCNT        ;SEE IF ODD FRAME COUNT
3933  016502  001450                        BEQ     DEREX           ;IF NOT: BR
3934  016504  105722                        TSTB    (R2)+           ;BUMP POINTER
3935  016506  000446                        BR      DEREX
3936  016510  013737  000556  000642  DERR4A: MOV    FMCNT,TEMP1     ;LOAD CHAR COUNT
3937  016516  005437  000642                NEG     TEMP1           ;**G FORM TWO'S COMPLEMENT
3938  016522  162737  000010  000642        SUB     #10,TEMP1       ;POINT TO BUFFER -8
3939  016530  013701  000642                MOV     TEMP1,R1        ;POINT TO NEXT CHAR
3940  016534  062701  027604                ADD     #WDATA,R1       ;POINT TO NEXT WRITE CHAR
3941  016540  013702  000642                MOV     TEMP1,R2        ;POINT TO END OF READ DATA -8 FORWARD
3942  016544  062702  033612                ADD     #RDATA,R2       ;POINT TO NEXT CHAR
3943  016550  000425                        BR      DEREX           ;EXIT
3944  016552  000337  000656      DERR4B:   SWAB    BBC             ;REPOSITION BBC
3945  016556  062705  000024                ADD     #24,R5          ;SKIP 20 CHARS
3946  016562  103416                        BCS     DERR6           ;IF EXCEED RECORD SIZE: BR
3947  016564  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3948  016572  001405                        BEQ     DERR5           ;IF NOT: BR
3949  016574  162701  000024                SUB     #24,R1
3950  016600  162702  000024                SUB     #24,R2          ;RESET POINTERS
3951  016604  000407                        BR      DEREX
3952  016606  062701  000024      DERR5:    ADD     #24,R1          ;SKIP 20 CHARS
3953  016612  062702  000024                ADD     #24,R2          ;SKIP FORWARD 20 CHARS
3954  016616  000402                        BR      DEREX
3955  016620  012705  177777      DERR6:    MOV     #-1,R5          ;SET TO EOR
```

```
 3956  016624  005777  161756          DEREX:  TST     @SWR            ;++G BRANCH IF CONTINUE ON ERROR
 3957  016630  100012                          BPL     DEREX1          ;++G
 3958  016632  104006                          STOPP
 3959  016634  005737  000670                  TST     PFLG            ;SEE IF PRINTED
 3960  016640  001006                          BNE     DEREX1          ;IF SO: BR
 3961  016642  032777  002000  161736          BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
 3962  016650  001002                          BNE     DEREX1          ;IF NOT: BR
 3963  016652  000137  016172                  JMP     DERRO           ;ELSE PRINT
 3964  016656  005037  000670          DEREX1: CLR     PFLG            ;CLEAR FLAG
 3965  016662  005237  000704                  INC     DERFL           ;BUMP DATA ERROR FLAG
 3966  016666  000207                          RTS     PC              ;RETURN
 3967
```

```
3968
3969                                    ;*************************************************************
3970                                    ;DROPS AND PICKS SUBROUTINE:
3971                                    ;
3972                                    ;THIS SUBROUTINE IS USED TO ACCUMULATE FROM
3973                                    ;EACH BAD DATA CHARACTER FOUND THE NUMBER
3974                                    ;OF BITS WHICH WERE EITHER DROPPED OR PICKED UP.
3975                                    ;TWO COUNTERS PER SLAVE ARE USED TO ACCUMULATE THIS
3976                                    ;INFORMATION AND CAN STORE UP TO 32K DROPS
3977                                    ;OR PICKS BEFORE OVERFLOWING.  IF OVERFLOW IS
3978                                    ;ABOUT TO OCCUR, THESE ACCUMULATORS ARE
3979                                    ;PRINTED IN OCTAL AND RESET TO ZERO.
3980                                    ;THE CONTENTS OF THE ACCUMULATORS MAY BE
3981                                    ;DISPLAYED AT ANY TIME BY SETTING CONSOLE
3982                                    ;SWITCH FOURTEEN TO A ONE (1). THE PRINTOUT WILL OCCUR
3983                                    ;AT THE END OF THE CURRENT BLOCK CYCLE.
3984                                    ;*************************************************************
3985
3986  016670  005037  000642        DRPKF:  CLR     TEMP1
3987  016674  005037  000644                CLR     TEMP2
3988  016700  005037  000646                CLR     TEMP3
3989  016704  111137  000642                MOVB    (R1),TEMP1      ;LOAD GOOD CHAR
3990  016710  111237  000644                MOVB    (R2),TEMP2      ;LOAD BAD CHAR
3991  016714  013704  000574                MOV     UNP,R4
3992  016720  016437  000572  000720        MOV     PIK1(R4),BPKP
3993  016726  016437  001012  000716        MOV     DRP1(R4),BDPP
3994  016734  032737  010000  000562        BIT     #10000,RDCMD    ;SEE IF READ REVERSE
3995  016742  001005                        BNE     DRPK            ;IF SO: BR
3996  016744  124142                        CMPB    -(R1),-(R2)     ;POINT TO CHAR
3997  016746  112137  000642                MOVB    (R1)+,TEMP1     ;LOAD GOOD CHAR
3998  016752  112237  000644                MOVB    (R2)+,TEMP2     ;LOAD BAD CHAR
3999  016756  004737  016770        DRPK:   JSR     PC,DROP         ;GET DROPS
4000  016762  004737  017206                JSR     PC,PICK         ;GET PICKS
4001  016766  000207                        RTS     PC              ;EXIT
4002  016770  113703  000642        DROP:   MOVB    TEMP1,R3        ;R3 = GOOD CHAR
4003  016774  113704  000644                MOVB    TEMP2,R4        ;R4 = BAD CHAR
4004  017000  140403                DPC:    BICB    R4,R3           ;GET DROPS/PICKS
4005  017002  001001                        BNE     DPCG            ;IF SOME: BR
4006  017004  000207                        RTS     PC              ;RETURN
4007  017006  012737  000010  000710DPCG:   MOV     #10,BCNT        ;SET NUMBER TO CHECK
4008  017014  132703  000001        DPC0:   BITB    #1,R3           ;SEE IF DROPPED OR PICKED THIS BIT
4009  017020  001455                        BEQ     DPC2            ;IF NOT: BR
4010  017022  105737  000646                TSTB    TEMP3           ;SEE IF ON PICKS
4011  017026  001016                        BNE     DPC1            ;IF SO: BR
4012  017030  005277  161662                INC     @BDPP           ;BUMP DROP CNTR
4013  017034  005777  161656                TST     @BDPP
4014  017040  100045                        BPL     DPC2            ;IF NO OVERFLOW: BR
4015  017042  032777  002000  161536        BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
4016  017050  001402                        BEQ     DPC0A           ;IF SO: BR
4017  017052  004737  022772                JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4018  017056  004737  017252        DPC0A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
4019  017062  000415                        BR      DPC2A
4020  017064  005277  161630        DPC1:   INC     @BPKP           ;BUMP PICK CNTR
4021  017070  005777  161624                TST     @BPKP           ;SEE IF OVERFLOW
4022  017074  100027                        BPL     DPC2            ;IF NOT: BR
4023  017076  032777  002000  161502        BIT     #2000,@SWR      ;SEE IF HAVE PRINTED DATA
```

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4024  017104  001402                          BEQ     DPC1A           ;IF SO: BR
4025  017106  004737  022772                  JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4026  017112  004737  017252          DPC1A:  JSR     PC,DPPRT        ;PRINT DROPS AND PICKS
4027  017116  013704  000674          DPC2A:  MOV     UNP,R4
4026  017122  016403  001012                  MOV     DRP1(R4),R3     ;SET DROP POINTER
4029  017126  016404  000772                  MOV     PIK1(R4),R4     ;SET PICK POINTER
4030  017132  012737  000010  000710          MOV     #10,BCNT        ;SET NUMBER OF BITS
4031  017140  005023                  DPC2B:  CLR     (R3)+           ;CLEAR DROPS
4032  017142  005024                          CLR     (R4)+           ;CLEAR PICK
4033  017144  005337  000710                  DEC     BCNT            ;SEE IF DONE
4034  017150  001373                          BNE     DPC2B           ;IF NOT: BR
4035  017152  000207                          RTS     PC              ;EXIT
4036  017154  000241                  DPC2:   CLC
4037  017156  106003                          RORB    R3              ;GET NEXT BIT
4038  017160  005337  000710                  DEC     BCNT            ;SEE IF DONE
4039  017164  001407                          BEQ     DPC3
4040  017166  062737  000002  000720          ADD     #2,BPKP
4041  017174  062737  000002  000716          ADD     #2,BDPP
4042  017202  000704                          BR      DPC0            ;++G CONTINUE
4043  017204  000207                  DPC3:   RTS     PC              ;RETURN
4044  017206  013704  000674          PICK:   MOV     UNP,R4          ;GET UNIT POINTER
4045  017212  016437  000772  000720          MOV     PIK1(R4),BPKP   ;SET PICK POINTER
4046  017220  016437  001012  000716          MOV     DRP1(R4),BDPP   ;SET DROP POINTER
4047  017226  113704  000642                  MOVB    TEMP1,R4        ;R4 = GOOD CHAR
4048  017232  113703  000644                  MOVB    TEMP2,R3        ;R3 = BAD CHAR
4049  017236  112737  000001  000646          MOVB    #1,TEMP3        ;SET PICK FLAG
4050  017244  004737  017000                  JSR     PC,DPC          ;GO CHECK PICKS
4051  017250  000207                          RTS     PC              ;EXIT
4052  017252  012704  025503          DPPRT:  MOV     #MSG26,R4
4053  017256  104000                          TTOUTT                  ;PRINT DROP HEADER
4054  017260  013704  000674                  MOV     UNP,R4
4055  017264  016437  001012  000716          MOV     DRP1(R4),BDPP   ;SET DROP POINTER
4056  017272  016437  000772  000720          MOV     PIK1(R4),BPKP   ;SET PICK POINTER
4057  017300  062737  000016  000716          ADD     #16,BDPP
4058  017306  062737  000016  000720          ADD     #16,BPKP
4059  017314  012737  000010  000710          MOV     #10,BCNT        ;SET NUMBER TO PRINT
4060  017322  017703  161370          DPPRT0: MOV     @BDPP,R3
4061  017326  104002                          OCTPP                   ;PRINT DROPS
4062  017330  005337  000710                  DEC     BCNT            ;SEE IF DONE
4063  017334  001404                          BEQ     DPPRT1          ;IF NOT: BR
4064  017336  162737  000002  000716          SUB     #2,BDPP         ;BUMP POINTER
4065  017344  000766                          BR      DPPRT0          ;CONTINUE FOR ALL 8 BITS
4066  017346  012737  000010  000710  DPPRT1: MOV     #10,BCNT        ;SET NUMBER TO PRINT
4067  017354  012704  025514                  MOV     #MSG27,R4
4068  017360  104000                          TTOUTT                  ;PRINT PICK HEADER
4069  017362  017703  161332          DPPRT2: MOV     @BPKP,R3
4070  017366  104002                          OCTPP                   ;PRINT PICKS
4071  017370  005337  000710                  DEC     BCNT            ;SEE IF DONE
4072  017374  001404                          BEQ     DPPRTX          ;IF SO: BR
4073  017376  162737  000002  000720          SUB     #2,BPKP         ;BUMP POINTER
4074  017404  000766                          BR      DPPRT2          ;CONTINUE FOR ALL 8 BITS
4075  017406  000207                  DPPRTX: RTS     PC              ;RETURN
```

```
4076
4077                                    ;*********************************************************
4078                                    ;STATUS CHECK SUBROUTINE:
4079                                    ;
4080                                    ;THIS SUBROUTINE IS USED TO PERFORM A CHECK OF
4081                                    ;BOTH THE MASSBUS CONTROLLER (RH11) AND THE TAPE
4082                                    ;CONTROLLER (TM02).  THE RH11 IS CHECKED FOR ERRORS
4083                                    ;AS REFLECTED IN REGISTERS CS1 AND CS2 AND ALSO THAT
4084                                    ;THE BUS ADDRESS (BA) AND WORD COUNT (WC) ARE
4085                                    ;CORRECT.  THE TM02 IS CHECKED FOR DRIVE STATIS (DS),
4086                                    ;DRIVE ERRORS (ER), AND PROPER FRAME COUNT.  THE SPECIAL
4087                                    ;CHECK CHARACTERS (CRC+LRC) ARE ALSO CHECKED WHEN
4088                                    ;APPROPIATE (IE: NRZ READ OR WRITE).  CERTAIN TYPES
4089                                    ;OF DRIVE ERRORS IN PE OPERATION WILL BE ACCOMPANIED
4090                                    ;BY THE DISPLAY OF THE DEAD TRACK REGISTER (CC).  THESE
4091                                    ;TYPES ARE ER BITS 15,10,7,6.  THE PRINTOUTS OF BAD
4092                                    ;CRC,LRC,FC, AND BA WILL SHOW BOTH THE EXPECTED AND
4093                                    ;RECEIVED VALUES (IE: EXPT-RCVD).  ONLY THOSE REGISTERS
4094                                    ;WHICH ARE IN ERROR WILL BE PRINTED AND ALL PRINTOUTS
4095                                    ;ARE IN OCTAL FORMAT WITH NO LEADING ZEROS.  AS IN
4096                                    ;DATA ERRORS, STATUS ERRORS ARE PRECEEDED BY HEADER
4097                                    ;DESCRIBING THE HARDWARE UNDER TEST, THE BLOCKING
4098                                    ;INFORMATION, AND THE ERROR TYPE.
4099                                    ;*********************************************************
4100
4101  017410  013703  000556        ERCHK:  MOV     FMCNT,R3        ;GET FRAME COUNT
4102  017414  032703  000001                BIT     #1,R3           ;SEE IF ODD
4103  017420  001401                        BEQ     ERO             ;IF NOT: BR
4104  017422  005303                        DEC     R3              ;BUMP COUNT
4105  017424  005403                ERO:    NEG     R3
4106  017426  032737  000020  000552        BIT     #20,UDES        ;SEE IF CORE DUMP
4107  017434  001402                        BEQ     EROB            ;IF NOT: BR
4108  017436  000241                        CLC
4109  017440  006003                        ROR     R3              ;SET TO FC/2
4110  017442  032737  000010  000672  EROB: BIT     #10,MTC1        ;SEE IF WRITE OP
4111  017450  001414                        BEQ     ER1             ;IF SO: BR
4112  017452  032737  010000  000562        BIT     #10000,RDCMD
4113  017460  001405                        BEQ     EROA
4114  017462  012703  033612                MOV     #RDATA,R3
4115  017466  162703  000002                SUB     #2,R3           ;SET POINTER
4116  017472  000405                        BR      ER2
4117  017474  062703  033612        EROA:   ADD     #RDATA,R3       ;BUILD EXPT READ ADDRESS
4118  017500  000402                        BR      ER2
4119  017502  062703  027604        ER1:    ADD     #WDATA,R3       ;BUILD EXPT WRITE ADDRESS
4120  017506  010337  021134        ER2:    MOV     R3,CADER        ;SAVE ADDRESS
4121  017512  012704  000007                MOV     #7,R4
4122  017516  012701  021136                MOV     #BAER,R1
4123  017522  005021                ER2AO:  CLR     (R1)+           ;CLEAR FLAGS
4124  017524  005304                        DEC     R4
4125  017526  001375                        BNE     ER2AO
4126  017530  020377  160760                CMP     R3,@BA          ;SEE IF ADDRESS OK
4127  017534  001402                        BEQ     ER2A1           ;IF SO: BR
4128  017536  005237  021136                INC     BAER            ;SET BUS ADDRESS ERROR
4129  017542  032737  000010  000672  ER2A1: BIT     #10,MTC1        ;SEE IF WRITE OPER
4130  017550  001006                        BNE     ER2B            ;IF NOT: BR
4131  017552  005777  160740        ER2A:   TST     @FC             ;SEE IF FC=0
```

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4132  017556  001441                          BEQ     ER3             ;IF SO: BR
4133  017560  005237  021144                  INC     FCER            ;SET FC ERROR
4134  017564  000436                          BR      ER3             ;↔G
4135  017566  032737  000040  000672  ER2B:   BIT     #40,MTC1        ;SEE IF SPACE OPER
4136  017574  001766                          BEQ     ER2A            ;IF SO: BR
4137  017576  005737  000676                  TST     TMFLG           ;SEE IF TM TIME
4138  017602  001011                          BNE     ER2D            ;IF SO: BR
4139  017604  013703  000556                  MOV     FMCNT,R3
4140  017610  005403                          NEG     R3              ;R3 = EXPT RECORD SIZE
4141  017612  020377  160700          ER2C:   CMP     R3,@FC          ;SEE IF FC = EXPT
4142  017616  001421                          BEQ     ER3             ;IF SO: BR
4143  017620  005237  021144                  INC     FCER            ;SET FC ERROR FLAG
4144  017624  000416                          BR      ER3             ;↔G
4145  017626  032737  002000  000552  ER2D:   BIT     #2000,UDES      ;SEE IF PE
4146  017634  001346                          BNE     ER2A            ;IF SO: BR
4147  017636  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
4148  017644  001003                          BNE     ER2E            ;IF SO: BR
4149  017646  012703  000002                  MOV     #2,R3
4150  017652  000757                          BR      ER2C            ;LOOK FOR EXPT = 2
4151  017654  012703  000001          ER2E:   MOV     #1,R3
4152  017660  000754                          BR      ER2C            ;GO CHECK FC FOR TM
4153  017662  032777  160000  160620  ER3:    BIT     #160000,@C1     ;SEE IF COUNT ERROR
4154  017670  001441                          BEQ     ER4
4155  017672  017703  160622                  MOV     @CS,R3          ;GET CONT STATUS REG
4156  017676  042703  000307                  BIC     #307,R3         ;MASK OUT IR,OR,UNIT NO.
4157  017702  005703                          TST     R3              ;SEE IF ANY OTHER ERRORS
4158  017704  001407                          BEQ     ER3A            ;IF NOT: BR
4159  017706  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4160  017712  001426                          BEQ     ER3B            ;IF NOT: BR
4161  017714  042703  001000                  BIC     #1000,R3        ;MASK MISSED TRANS
4162  017720  005703                          TST     R3              ;SEE IF ANY OTHER ERRORS
4163  017722  001022                          BNE     ER3B            ;IF SO: BR
4164  017724  032777  060000  160556  ER3A:   BIT     #60000,@C1      ;SEE IF EITHER TRE OR MCPE
4165  017732  001420                          BEQ     ER4             ;IF NOT: BR
4166  017734  005737  000676                  TST     TMFLG           ;SEE IF TM TIME
4167  017740  001413                          BEQ     ER3B            ;IF NOT: BR
4168  017742  017703  160556                  MOV     @ER,R3          ;GET ERROR REGISTER
4169  017746  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
4170  017754  001402                          BEQ     ER3A1           ;IF NOT: BR
4171  017756  042703  000100                  BIC     #100,R3         ;MASK PAR
4172  017762  042703  001000          ER3A1:  BIC     #1000,R3        ;MASK FCE
4173  017766  001402                          BEQ     ER4             ;IF NO ERRORS EXCEPT FCE: BR
4174  017770  005237  021140          ER3B:   INC     CONER           ;SET CONT ERROR FLAG
4175  017774  032777  040000  160520  ER4:    BIT     #40000,@DS      ;SEE IF DRIVE ERROR
4176  020002  001420                          BEQ     ER6             ;IF NOT: BR
4177  020004  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4178  020010  001413                          BEQ     ER4A            ;IF NOT: BR
4179  020012  017703  160506                  MOV     @ER,R3          ;GET ER
4180  020016  032737  000010  000552          BIT     #10,UDES        ;SEE IF EVEN PARITY
4181  020024  001402                          BEQ     ER4A1           ;IF NOT: BR
4182  020026  042703  000100                  BIC     #100,R3         ;MASK PAR
4183  020032  042703  001000          ER4A1:  BIC     #1000,R3        ;MASK OUT FCE
4184  020036  001402                          BEQ     ER6             ;↔G & BR IF NO OTHER ERR BITS ARE SET
4185  020040  005237  021142          ER4A:   INC     DRVER           ;SET DRIVER ERROR FLAG
4186  020044  032737  002000  000552  ER6:    BIT     #2000,UDES
4187  020052  001071                          BNE     ERPT            ;IF IN PE MODE: BR
```

```
4188  020054  032777  020000  160524          BIT     #20000,@SWR     ;SEE IF NO DATA CHECK
4189  020062  001065                          BNE     ERPT            ;IF NOT: BR (ALLOW READ OF UNKNOWN TAPES)
4190  020064  032737  000040  000672          BIT     #40,MTC1        ;SEE IF WRITE OR READ OP
4191  020072  001461                          BEQ     ERPT            ;IF NOT: BR
4192  020074  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
4193  020100  001413                          BEQ     ER6A            ;IF NOT: BR
4194  020102  013737  015540  021156          MOV     EXCRC,CRCSV     ;SAVE CRC
4195  020110  013737  015542  021154          MOV     EXLRC,LRCSV     ;SAVE LRC
4196  020116  005037  015540                  CLR     EXCRC
4197  020122  012737  000023  015542          MOV     #23,EXLRC       ;SET CRC/LRC FOR TM
4198  020130  032737  000060  000552  ER6A:   BIT     #60,UDES        ;SEE IF FORMAT 14
4199  020136  001037                          BNE     ERPT            ;IF NOT: BR
4200  020140  017703  160364                  MOV     @CC,R3          ;GET CRC CHARACTER
4201  020144  042703  177000                  BIC     #177000,R3
4202  020150  023703  015540                  CMP     EXCRC,R3
4203  020154  001402                          BEQ     ER7             ;IF CRC GOOD: BR
4204  020156  005237  021150                  INC     CRCER           ;SET ERROR FLAG
4205  020162  017703  160346          ER7:    MOV     @MR,R3          ;GET LRC
4206  020166  000303                          SWAB    R3
4207  020170  005703                          TST     R3
4208  020172  100002                          BPL     ER10
4209  020174  052703  000400                  BIS     #400,R3
4210  020200  042703  177000          ER10:   BIC     #177000,R3
4211  020204  023703  015542                  CMP     EXLRC,R3
4212  020210  001412                          BEQ     ERPT            ;IF LRC GOOD: BR
4213  020212  010337  021152                  MOV     R3,ACTLRC       ;SAVE ACTUAL LRC
4214  020216  005237  021146                  INC     LRCER           ;SET LRC ERROR FLAG
4215  020222  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
4216  020230  001402                          BEQ     ERPT            ;IF NOT: BR
4217  020232  005037  021146                  CLR     LRCER           ;ELSE CLEAR LRC ERROR
4218  020236  012703  000006          ERPT:   MOV     #6,R3
4219  020242  005037  000706                  CLR     SERFL           ;CLEAR ERROR FLAG
4220  020246  005037  000722                  CLR     ERSAV
4221  020252  012704  021136                  MOV     #BAER,R4
4222  020256  005724                  ERPTT:  TST     (R4)+           ;SEE IF ANY ERROR
4223  020260  001004                          BNE     ERPTG           ;IF SO: BR
4224  020262  005303                          DEC     R3
4225  020264  001374                          BNE     ERPTT
4226  020266  000137  021100                  JMP     ERPX1
4227  020272  005237  000706          ERPTG:  INC     SERFL           ;SET ERROR FLAG
4228  020276  017737  160222  000722          MOV     @ER,ERSAV       ;SAVE ERROR REGISTER
4229  020304  032777  002000  160274          BIT     #2000,@SWR      ;SEE IF PRINT
4230  020312  001420                          BEQ     ERPTO           ;IF SO: BR
4231  020314  022737  000002  000712          CMP     #2,RTYFL        ;SEE IF READ RETRY
4232  020322  001006                          BNE     ERPTG1          ;IF NOT: BR
4233  020324  013703  000702                  MOV     RTCNT,R3
4234  020330  005203                          INC     R3              ;BUMP RETRY COUNT
4235  020332  020337  000602                  CMP     R3,RETRY        ;SEE IF LAST RETRY
4236  020336  001406                          BEQ     ERPTO           ;IF SO: BR
4237  020340  022737  000002  021142  ERPTG1: CMP     #2,DRVER        ;SEE IF TM STATUS ERROR
4238  020346  001402                          BEQ     ERPTO           ;IF SO: BR
4239  020350  000137  021002                  JMP     ERPXO
4240  020354  005237  000670          ERPTO:  INC     PFLG
4241  020360  004737  022772                  JSR     PC,PAPRT        ;PRINT HEADER
4242  020364  013704  000652                  MOV     EMADDR,R4
4243  020370  104000                          TTOUTT                  ;PRINT ERROR TYPE
```

```
4244  020372  004737  021160            JSR     PC,ERPRT        ;PRINT F OR R
4245  020376  005737  000676            TST     TMFLG
4246  020402  001407                    BEQ     ERPT1
4247  020404  022737  026312  000652    CMP     #MSG54,EMADDR
4248  020412  001403                    BEQ     ERPT1
4249  020414  012704  026330            MOV     #MSG56,R4       ;PRINT TM
4250  020420  104000                    TTOUTT
4251  020422  005737  021140  ERPT1:    TST     CONER
4252  020426  001414                    BEQ     ERPT2           ;IF NO CONT ERROR: BR
4253  020430  012704  025333            MOV     #MSG23,R4
4254  020434  104000                    TTOUTT                  ;PRINT C1 TAG
4255  020436  017703  160046            MOV     @C1,R3
4256  020442  104002                    OCTPP                   ;PRINT CONTROL 1
4257  020444  012704  025360            MOV     #MSG23D,R4      ;PRINT CS TAG
4258  020450  104000                    TTOUTT
4259  020452  017703  160042            MOV     @CS,R3
4260  020456  104002                    OCTPP                   ;PRINT CONT STATUS
4261  020460  005737  021142  ERPT2:    TST     DRVER
4262  020464  001414                    BEQ     ERPT3           ;IF SO DRIVE ERROR: BR
4263  020466  012704  025366            MOV     #MSG23E,R4
4264  020472  104000                    TTOUTT                  ;PRINT DS TAG
4265  020474  017703  160022            MOV     @DS,R3
4266  020500  104002                    OCTPP                   ;PRINT DRIVE STATUS
4267  020502  012704  025373            MOV     #MSG23F,R4
4268  020506  104000                    TTOUTT                  ;PRINT ER TAG
4269  020510  017703  160010            MOV     @ER,R3
4270  020514  104002                    OCTPP                   ;PRINT DRIVE ERROR
4271  020516  005737  021136  ERPT3:    TST     BAER
4272  020522  001416                    BEQ     ERPT4           ;IF NO BA ERROR: BR
4273  020524  012704  025346            MOV     #MSG23B,R4
4274  020530  104000                    TTOUTT                  ;PRINT BA TAG
4275  020532  017703  157756            MOV     @BA,R3
4276  020536  104002                    OCTPP                   ;PRINT BUS ADDRESS
4277  020540  012737  000255  000636    MOV     #255,TOB
4278  020546  004737  023724            JSR     PC,TOG          ;PRINT /
4279  020552  013703  021134            MOV     CADER,R3
4280  020556  104002                    OCTPP                   ;PRINT EXPT BUS ADDRESS
4281  020560  005737  021144  ERPT4:    TST     FCER
4282  020564  001406                    BEQ     ERPT5           ;IF NO FC ERROR: BR
4283  020566  012704  025353            MOV     #MSG23C,R4
4284  020572  104000                    TTOUTT                  ;PRINT FC TAG
4285  020574  017703  157716            MOV     @FC,R3
4286  020600  104002                    OCTPP                   ;PRINT FRAME COUNT
4287  020602  012704  025341  ERPT5:    MOV     #MSG23A,R4
4288  020606  104000                    TTOUTT                  ;PRINT WC TAG
4289  020610  017703  157676            MOV     @WC,R3
4290  020614  104002                    OCTPP                   ;PRINT WORD COUNT
4291  020616  005737  021150            TST     CRCER
4292  020622  001420                    BEQ     ERPT5A          ;IF NO CRC ERROR: BR
4293  020624  012704  026355            MOV     #MSG58,R4
4294  020630  104000                    TTOUTT                  ;PRINT CRC TAG
4295  020632  017703  157672            MOV     @CC,R3
4296  020636  042703  177000            BIC     #177000,R3
4297  020642  104002                    OCTPP                   ;PRINT ACTUAL CRC
4298  020644  012737  000255  000636    MOV     #255,TOB
4299  020652  004737  023724            JSR     PC,TOG
```

```
4300  020656  013703  015540                MOV     EXCRC,R3
4301  020662  104002                        OCTPP                   ;PRINT EXPECTED CRC
4302  020664  005737  021146        ERPT5A: TST     LRCER
4303  020670  001416                        BEQ     ERPT6           ;IF NO LRC ERROR: BR
4304  020672  012704  026363                MOV     #MSG59,R4
4305  020676  104000                        TTOUTT                  ;PRINT LRC TAG
4306  020700  013703  021152                MOV     ACTLRC,R3
4307  020704  104002                        OCTPP                   ;PRINT ACTUAL LRC
4308  020706  012737  000255  000636        MOV     #255,TOB
4309  020714  004737  023724                JSR     PC,TOG
4310  020720  013703  015542                MOV     EXLRC,R3
4311  020724  104002                        OCTPP                   ;PRINT EXPECTED LRC
4312  020726  005737  021142        ERPT6:  TST     DRVER
4313  020732  001422                        BEQ     ERPT7           ;IF NO DRIVE ERROR: BR
4314  020734  032737  002000  000552        BIT     #2000,UDES
4315  020742  001416                        BEQ     ERPT7           ;IF NO PE: BR
4316  020744  017704  157554                MOV     @ER,R4
4317  020750  042704  075477                BIC     #75477,R4       ;MASK OUT ALL BUT BITS 15,10,7,6
4318  020754  005704                        TST     R4
4319  020756  001410                        BEQ     ERPT7           ;IF NO CONDITIONALS SET: BR
4320  020760  012704  025405                MOV     #MSG23H,R4
4321  020764  104000                        TTOUTT                  ;PRINT CC TAG
4322  020766  017703  157536                MOV     @CC,R3
4323  020772  042703  177000                BIC     #177000,R3      ;MASK CC
4324  020776  104002                        OCTPP                   ;PRINT CHECK CHARACTERS
4325  021000  000240        ERPT7:  NOP
4326  021002  032777  100000  157576 ERPX0: BIT     #100000,@SWR    ;SEE IF STOP ON ERROR
4327  021010  001412                        BEQ     ERPX            ;IF NOT: BR
4328  021012  104006                        STOPP
4329  021014  005737  000670                TST     PFLG            ;SEE IF HAVE PRINTED
4330  021020  001006                        BNE     ERPX            ;IF SO: BR
4331  021022  032777  002000  157556        BIT     #2000,@SWR      ;SEE IF SHOULD PRINT
4332  021030  001002                        BNE     ERPX            ;IF NOT: BR
4333  021032  000137  020354                JMP     ERPTO           ;PRINT ERROR
4334  021036  005037  000670        ERPX:   CLR     PFLG
4335  021042  012777  000011  157440        MOV     #11,@C1         ;DRIVE CLEAR
4336  021050  017704  157452                MOV     @AS,R4
4337  021054  010477  157446                MOV     R4,@AS          ;CLEAR AS
4338  021060  013704  000510                MOV     C1,R4
4339  021064  005204                        INC     R4
4340  021066  152714  000100                BISB    #100,(R4)       ;RESET TRE
4341  021072  013777  000552  157442        MOV     UDES,@C2        ;RESET TC
4342  021100  032737  000040  000672 ERPX1: BIT     #40,MTC1
4343  021106  001411                        BEQ     ERPX2           ;IF NOT READ/WRITE OP: BR
4344  021110  005737  000676                TST     TMFLG
4345  021114  001406                        BEQ     ERPX2           ;IF NOT TM TIME: BR
4346  021116  013737  021156  015540        MOV     CRCSV,EXCRC     ;RESTORE CRC
4347  021124  013737  021154  015542        MOV     LRCSV,EXLRC     ;RESTORE LRC
4348  021132  000207        ERPX2:  RTS     PC                      ;EXIT
4349  021134  000000        CADER:  0                               ;EXPT ADDRESS SAVE
4350  021136  000000        BAER:   0
4351  021140  000000        CONER:  0
4352  021142  000000        DRVER:  0
4353  021144  000000        FCER:   0
4354  021146  000000        LRCER:  0
4355  021150  000000        CRCER:  0
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```
 4356  021152  000000                  ACTLRC: 0
 4357  021154  000000                  LRCSV:  0
 4358  021156  000000                  CRCSV:  0
 4359
 4360                                  ;*************************************************************
 4361                                  ;F FOR FORWARD/R FOR REVERSE PRINT SUBROUTINE:
 4362                                  ;
 4363                                  ;THIS SUBROUTINE IS USED TO PRINT OUT THE
 4364                                  ;TAPE DIRECTION USED WHEN ANY ERROR IS
 4365                                  ;DETECTED IN STATUS OF READ OR WRITE, DATA, OR
 4366                                  ;SPACING OPERATIONS.
 4367                                  ;*************************************************************
 4368
 4369  021160  032737  000010  000672  FRPRT:  BIT     #10,MTC1        ;SEE IF WRITE COMMAND
 4370  021166  001413                          BEQ     FREX            ;IF SO: BR
 4371  021170  032737  000002  000672          BIT     #2,MTC1         ;SEE IF REVERSE
 4372  021176  001404                          BEQ     FRO             ;IF NOT: BR
 4373  021200  012704  025243                  MOV     #MSG17,R4
 4374  021204  104000                          TTOUTT                  ;PRINT R
 4375  021206  000403                          BR      FREX
 4376  021210  012704  025240          FRO:    MOV     #MSG16,R4
 4377  021214  104000                          TTOUTT                  ;PRINT F
 4378  021216  000207                  FREX:   RTS     PC              ;EXIT
 4379
```

```
4380
4381                                    ;*************************************************************
4382                                    ;TAPE COMMAND EXECUTE SUBROUTINE:
4383                                    ;
4384                                    ;THIS SUBROUTINE IS USED TO EXECUTE THE
4385                                    ;MAG TAPE COMMAND DESCRIBED BY THE READ
4386                                    ;OR WRITE ROUTINE.  THE FINAL COMMAND IS
4387                                    ;SENT TO THE DEVICE REGISTER ALONG WITH THE
4388                                    ;INTERRUPT ENABLE AND GO BITS.
4389                                    ;ONCE THE COMMAND IS ISSUED, AN INTERRUPT
4390                                    ;TIMER IS STARTED AND IF NO INTERRUPT IS RETURNED
4391                                    ;BEFORE TIME OUT OCCURS, AN ERROR WILL BE
4392                                    ;PRINTED AND THE PROGRAM STOPPED.  TESTING MAY
4393                                    ;BE RESUMED BY PRESSING THE CONTINUE SWITCH.
4394                                    ;TWO INTERRUPT HANDLERS ARE USED, ONE FOR MAG TAPE
4395                                    ;AND ANOTHER FOR TELETYPE (TTY).
4396                                    ;UPON RECEIPT OF A MAG TAPE INTERRUPT, HOUSEKEEPING
4397                                    ;IS PERFORMED AND CONTROL RETURNED TO THE CALLING
4398                                    ;ROUTINE (READ,WRITE,ETC).
4399                                    ;RECEIPT OF A TTY INTERRUPT WILL CAUSE THE
4400                                    ;PROGRAM TO CHECK FOR ENTRY OF A CNTRL C CHARACTER.
4401                                    ;IF NOT CNTRL C, THEN CONTINUATION OF WAIT FOR MAG
4402                                    ;TAPE INTERRUPT IS RETURNED.  IF, HOWEVER, THE TTY
4403                                    ;INTERRUPT WAS CAUSED BY ENTRY OF A CNTRL C,
4404                                    ;THEN AT THIS TIME REQUESTS FOR NEW STALL VALUES
4405                                    ;ARE PRINTED AND THE RESPONSES ENTERED.  RESUMPTION
4406                                    ;OF TAPE INTERRUPT WAIT IS THEN RESUMED.
4407                                    ;*************************************************************
4408
4409  021220  005037  000642          TAPG:   CLR     TEMP1
4410  021224  013777  000550  157266          MOV     DVN,@CS         ;SET DRIVE NO.
4411  021232  032777  010000  157262  TAPG0:  BIT     #10000,@DS      ;SEE IF HAVE MOL
4412  021240  001026                  BNE     TAPG3           ;IF SO: BR
4413  021242  005237  000642          INC     TEMP1           ;SEE IF TIMED OUT
4414  021246  001371                  BNE     TAPG0           ;WAIT FOR READY
4415  021250  004737  022772          JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4416  021254  032737  000010  000672  BIT     #10,MTC1        ;SEE IF WRITE OP
4417  021262  001004                  BNE     TAPG1           ;IF NOT: BR
4418  021264  012704  025102          MOV     #MSG5,R4
4419  021270  104000                  TTOUTT                  ;PRINT WRITE ERR
4420  021272  000405                  BR      TAPG2
4421  021274  012704  025107  TAPG1:  MOV     #MSG6,R4
4422  021300  104000                  TTOUTT                  ;PRINT READ ERR
4423  021302  004737  021160          JSR     PC,FRPRT        ;PRINT F OR R
4424  021306  012704  025463  TAPG2:  MOV     #MSG25,R4
4425  021312  104000                  TTOUTT                  ;PRINT NO MOL ERR
4426  021314  104006                  STOPP
4427  021316  032777  020000  157176  TAPG3:  BIT     #20000,@DS      ;SEE IF PIP RESET
4428  021324  001411                  BEQ     TAPG3F          ;IF SO: BR
4429  021326  004737  022772          JSR     PC,PAPRT        ;PRINT HEADER
4430  021332  012704  027442          MOV     #MSG116,R4
4431  021336  104000                  TTOUTT                  ;PRINT REWINDING MESSAGE
4432  021340  032777  020000  157154  1$:     BIT     #20000,@DS
4433  021346  001374                  BNE     1$              ;AWAIT PIP RESET
4434  021350  022737  000026  000672  TAPG3F: CMP     #26,MTC1        ;SEE IF WRITE TM
4435  021356  001003                  BNE     TAPG3A          ;IF NOT: BR
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4436  021360  012704  177777                MOV     #-1,R4          ;ELSE SET FC FOR -1
4437  021364  000406                      BR      TAPG3B
4438  021366  013704  000556      TAPG3A: MOV     FMCNT,R4
4439  021372  032704  000001              BIT     #1,R4
4440  021376  001401                      BEQ     TAPG3B
4441  021400  005304                      DEC     R4
4442  021402  000261      TAPG3B: SEC
4443  021404  006004                      ROR     R4              ;SET WC = FC/2 FOR NORMAL FORMAT
4444  021406  032737  000020  000552      BIT     #20,UDES        ;SEE IF CORE DUMP FORMAT
4445  021414  001402                      BEQ     TAPG3C          ;IF NOT: BR
4446  021416  000261                      SEC
4447  021420  006004                      ROR     R4              ;SET WC = FC/4 FOR CORE DUMP
4448  021422  010477  157064      TAPG3C: MOV     R4,@WC          ;SET WORD COUNT
4449  021426  012777  000011  157054      MOV     #11,@C1         ;DRIVE CLEAR
4450  021434  017777  157056  157054      MOV     @FC,@FC         ;RESET FC LOADED
4451  021442  005737  000566              TST     INTRF           ;SEE IF INTERCHANGE READ
4452  021446  001407                      BEQ     TAPG3D          ;IF NOT: BR
4453  021450  032737  000040  000672      BIT     #40,MTC1        ;SEE IF READ OP
4454  021456  001403                      BEQ     TAPG3D          ;IF NOT: BR
4455  021460  012777  000003  157046      MOV     #3,@MR          ;SET INTERCHANGE READ MAINT. MODE
4456  021466  013704  000672      TAPG3D: MOV     MTC1,R4         ;GET COMMAND
4457  021472  042704  177707              BIC     #177707,R4      ;MASK OP CODE
4458  021476  022704  000030              CMP     #30,R4          ;SEE IF SPACE OP CODE
4459  021502  001403                      BEQ     TAPG3E          ;IF SO: BR
4460  021504  012737  177740  000666      MOV     #-40,STAL       ;SET INTERRUPT DELAY MULT TO 40
4461  021512  052737  000101  000672  TAPG3E: BIS     #101,MTC1       ;SET INTERRUPT ENABLE AND GO
4462  021520  000240                      NOP
4463  021522  013777  000672  156760      MOV     MTC1,@C1        ;EXECUTE COMMAND
4464  021530  005077  157050              CLR     @PSW            ;CLEAR PRIORITY
4465  021534  005037  000642              CLR     TEMP1
4466  021540  005237  000642      TAPG4:  INC     TEMP1           ;SEE IF HAVE TIMED OUT
4467  021544  001375                      BNE     TAPG4           ;IF NOT: BR
4468  021546  005237  000666              INC     STAL
4469  021552  001372                      BNE     TAPG4           ;DO TIME DELAY MULTIPLIER
4470  021554  012777  000340  157022  TAPG5:  MOV     #340,@PSW       ;RESET PRIORITY
4471  021562  032777  002000  157016      BIT     #2000,@SWR      ;SEE IF SHOULD PRINT ERRORS
4472  021570  001012                      BNE     TAPG6           ;IF NOT: BR
4473  021572  004737  022772              JSR     PC,PAPRT        ;PRINT CYCLE NUMBER
4474  021576  013704  000652              MOV     EMADDR,R4
4475  021602  104000                      TTOUTT                  ;PRINT ERROR OP
4476  021604  004737  021160              JSR     PC,FRPRT        ;PRINT F OR R
4477  021610  012704  025443              MOV     #MSG24,R4
4478  021614  104000                      TTOUTT                  ;PRINT NO INTERRUPT
4479  021616  005777  156764      TAPG6:  TST     @SWR            ;++G BRANCH IF CONTINUE ON ERROR
4480  021622  100001                      BPL     TAPG7
4481  021624  104006                      STOPP
4482  021626  000137  021752      TAPG7:  JMP     MTINTA          ;RETURN TO CALLING ROUTINE
4483
```

```
4484
4485                                        ;TTY INTERRUPT HANDLER**********
4486
4487  021632  012777  000340  156744  TTINT:  MOV     #340,@PSW       ;RESET PSW
4488  021640  017746  156746                  MOV     @TKB,-(SP)      ;++G GET CHARACTER
4489  021644  042716  000200                  BIC     #200,(SP)       ;++G STRIP PARITY BIT
4490  021650  122716  000003                  CMPB    #3,(SP)         ;++G SEE IF CONT C
4491  021654  001427                          BEQ     TTINTO          ;IF SO: BR
4492  021656  122716  000007                  CMPB    #7,(SP)         ;++G CHECK FOR CNTL G
4493  021662  001007                          BNE     1$              ;+JH
4494  021664  022737  000176  000606          CMP     #SWREG,SWR      ;IS SOFTWARE SWITCH REGISTER USED
4495  021672  001024                          BNE     RETURN          ;NO, GET OUT
4496  021674  004737  024572                  JSR     PC,CNTG         ;GO CHANGE SWREG
4497  021700  000421                          BR      RETURN          ;+;G GO TO EXIT
4498
4499  021702  122716  000023          1$:     CMPB    #23,(SP)        ;+JH SEE IF ↑S WAS TYPED
4500  021706  001004                          BNE     2$              ;+JH BRANCH IF NOT
4501  021710  112737  000377  000746          MOVB    #377,$CTRLS     ;+JH SET XON FLAG
4502  021716  000412                          BR      RETURN          ;+JH AND RETURN
4503  021720  122716  000021          2$:     CMPB    #21,(SP)        ;+JH SEE IF ↑Q WAS TYPED
4504  021724  001007                          BNE     RETURN          ;+JH BRANCH IF NOT
4505  021726  105037  000746                  CLRB    $CTRLS          ;+JH CLEAR XON FLAG
4506  021732  000404                          BR      RETURN          ;+JH AND RETURN
4507
4508  021734  010046          TTINTO: MOV     R0,-(SP)        ;++G SAVE R0(REC CNTR)
4509  021736  004737  013776                  JSR     PC,TINP4        ;GO GET STALL VALUES
4510  021742  012600                          MOV     (SP)+,R0        ;++G RESTORE R0(REC CNTR)
4511  021744  005726          RETURN: TST     (SP)+           ;++G POP CHAR OFF STACK
4512  021746  000002                  RTI                     ;RETURN
4513
4514                                        ;MAG TAPE INTERRUPT HANDLER**********
4515
4516  021750  000240          MTINT:  NOP
4517  021752  042777  000037  156554  MTINTA: BIC     #37,@MR         ;CLEAR MAINT MODE
4518  021760  013716  000662                  MOV     RTRN,(SP)       ;++G GET RETURN ADDRESS
4519  021764  000002                          RTI                     ;++G RETURN
```

```
4520                                    ;**************************************
4521                                    ;AUTO SEQUENCE
4522                                    ;
4523                                    ;THIS ROUTINE ,ENTERED VIA STARTING ADDRESS 240
4524                                    ;WILL EXERCISE ALL AVAILABLE SLAVES ON ALL AVAILABLE
4525                                    ;DRIVES IN BOTH PE AND NRZ ACCORDING TO THE PRESELECTED
4526                                    ;TEST PLAN. IF NRZ ONLY, PE TESTING WILL NOT BE ATTEMPTED.
4527                                    ;**************************************
4528
4529  021766  012704  027252        ASEQ:   MOV     #MSG108,R4
4530  021772  104000                        TTOUTT                  ;PRINT NRZ ONLY REQUEST
4531  021774  012705  000650                MOV     #NRZOF,R5       ;SET ADDRESS OF FLAG
4532  022000  012701  000001                MOV     #1,R1           ;SET SIZE OF ENTRY
4533  022004  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
4534  022010  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
4535  022014  004737  023410                JSR     PC,TTR          ;GO GET RESPONSE
4536  022020  012704  027047                MOV     #MSG104,R4
4537  022024  104000                        TTOUTT                  ;REQUEST CONT OR NOT
4538  022026  012705  000742                MOV     #ASEQCF,R5      ;SET ADDRESS OF ENTRY
4539  022032  012701  000001                MOV     #1,R1           ;SET SIZE OF ENTRY
4540  022036  012702  000001                MOV     #1,R2           ;SET UPPER LIMIT
4541  022042  012703  000000                MOV     #0,R3           ;SET LOWER LIMIT
4542  022046  004737  023410                JSR     PC,TTR          ;GO GET INPUT
4543  022052  005037  000736        ASEQ0:  CLR     ADRVN           ;CLEAR DRV NUM
4544  022056  004737  022216        ASEQ1:  JSR     PC,HRDS         ;GO SELECT HARDWARE CONFIGURATION
4545  022062  005737  000042                TST     @042            ;AUTO MODE? ++ C.W
4546  022066  001404                        BEQ     1$              ;BRANCH - IF NO ++ C.W
4547  022070  012737  000001  000742        MOV     #1,ASEQCF       ;SET AUTO SEQ FLAG ++ C.W
4548  022076  000414                        BR      2$              ;DO AUTO SEQ TESTS ++ C.W
4549  022100  012704  027013        1$:     MOV     #MSG101,R4
4550  022104  104000                        TTOUTT                  ;PRINT DIVIDER
4551  022106  012704  027027                MOV     #MSG102,R4
4552  022112  104000                        TTOUTT                  ;PRINT TM02 NUMBER
4553  022114  013703  000736                MOV     ADRVN,R3
4554  022120  104002                        OCTPP                   ;PRINT TM02
4555  022122  012704  027036                MOV     #MSG103,R4
4556  022126  104000                        TTOUTT                  ;PRINT SLAVE HDR
4557  022130  012700  000750        2$:     MOV     #UN1,R0         ;POINT TO START OF SLAVE TABLE
4558  022134  005710                ASEQ2:  TST     (R0)            ;SEE IF END
4559  022136  100403                        BMI     ASEQ3           ;IF SO: BR
4560  022140  012003                        MOV     (R0)+,R3
4561  022142  104002                        OCTPP                   ;PRINT SLAVE TABLE
4562  022144  000773                        BR      ASEQ2           ;DO ALL
4563  022146  004737  022422        ASEQ3:  JSR     PC,AMOD1        ;GO DO MODE 1(NRZ)
4564  022152  004737  022616                JSR     PC,AMOD2        ;GO DO MODE 2(PE)
4565  022156  022737  000007  000736  ASEQ4:  CMP     #7,ADRVN        ;SEE IF DONE ALL DRIVES
4566  022164  001403                        BEQ     ASEQX           ;IF SO: BR
4567  022166  005237  000736                INC     ADRVN           ;BUMP DRIVE NUMBER
4568  022172  000731                        BR      ASEQ1           ;CONTINUE
4569  022174  005737  000742        ASEQX:  TST     ASEQCF          ;CONTINUOUS AUTO SEQUENCE? ++ C.W
4570  022200  001405                        BEQ     1$              ;BRANCH - IF NO ++ C.W
4571  022202  004737  005102                JSR     PC,TEND         ;GO DO ACT END OF PASS
4572  022206  005737  000734                TST     ASEQF           ;CONTINUE
4573  022212  001317                        BNE     ASEQ0           ;GO START AGAIN
4574  022214  000000                1$:     HALT
```

```
4575
4576                                    ;SUBROUTINE TO SELECT AUTO SEQUENCE HARDWARE********
4577
4578  022216  005037  005160            HRDS:   CLR     REOTC           ;CLEAR EOT UNIT CNTR
4579  022222  005037  000642                    CLR     TEMP1
4580  022226  012777  000040  156264            MOV     #40,@CS         ;INIT
4581  022234  013777  000736  156256            MOV     ADRVN,@CS       ;SET DRIVE
4582  022242  017701  156270                    MOV     @DT,R1          ;READ DRIVE TYPE
4583  022246  032777  010000  156244            BIT     #10000,@CS      ;TEST FOR NON-EXISTANT DRIVE
4584  022254  001403                            BEQ     HRDS1           ;IF DRIVE AVAIL: BR
4585  022256  005726                    HRDS0:  TST     (SP)+           ;RESET STACK POINTER
4586  022260  000137  022156                    JMP     ASEQ4           ;GO SEE IF TRIED ALL DRIVES
4587  022264  042701  002007            HRDS1:  BIC     #2007,R1        ;MASK SLAVE TYPE
4588  022270  022701  140010                    CMP     #140010,R1      ;++G SEE IF TU16/TE16 TAPE
4589  022274  001370                            BNE     HRDS0           ;IF NOT: BR
4590  022276  005000                            CLR     R0
4591  022300  012701  000750                    MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4592  022304  005737  003042                    TST     CHNFLG          ;++G BRANCH IF NOT IN CHAIN MODE
4593  022310  001410                            BEQ     HRDS2
4594  022312  122737  000006  000041            CMPB    #6,@#41         ;++G BRANCH IF NOT LOADED VIA TMDP
4595  022320  001004                            BNE     HRDS2
4596  022322  005737  000736                    TST     ADRVN           ;++G BRANCH IF NOT DRIVE 0
4597  022326  001001                            BNE     HRDS2           ;++G
4598  022330  005200                            INC     R0              ;++G DO NOT TEST DRIVE 0 SLAVE 0
4599                                            ;++G IF TMDP CHAIN
4600  022332  010077  156204            HRDS2:  MOV     R0,@C2          ;SELECT SLAVE
4601  022336  032777  010000  156156            BIT     #10000,@DS      ;SEE IF SLAVE AVAIL FOR TEST(MOL)
4602  022344  001403                            BEQ     HRDS3           ;IF NOT: BR
4603  022346  005237  000642                    INC     TEMP1           ;SET SLAVE FOUND FLAG
4604  022352  010021                            MOV     R0,(R1)+        ;LOAD SLAVE TABLE
4605  022354  022700  000007            HRDS3:  CMP     #7,R0           ;SEE IF DONE ALL SLAVES
4606  022360  001402                            BEQ     HRDS4           ;IF SO: BR
4607  022362  005200                            INC     R0              ;ELSE BUMP SLAVE NUMBER
4608  022364  000762                            BR      HRDS2           ;CONTINUE SELECTION
4609  022366  005737  000642            HRDS4:  TST     TEMP1           ;SEE IF FOUND ANY SLAVES
4610  022372  001731                            BEQ     HRDS0           ;IF NOT: BR
4611  022374  013737  000642  0051F0            MOV     TEMP1,REOTC     ;SET NUMBER OF UNITS
4612  022402  000337  000642                    SWAB    TEMP1
4613  022406  053737  000642  005160            BIS     TEMP1,REOTC     ;SET EOT CNTR
4614  022414  012711  177777                    MOV     #-1,(R1)        ;TERMINATE SLAVE TABLE
4615  022420  000207                            RTS     PC              ;RETURN TO SEQ
```

```
4616
4617                                    ;SUBROUTINE TO SELECT NRZ AUTO TEST MODE**********
4618
4619  022422  005037  000654            AMOD1:  CLR     BLCNTR          ;ASSURE BLOCK COUNTER IS 0
4620  022426  012701  000750                    MOV     @UN1,R1         ;GET START OF SLAVE TABLE
4621  022432  052721  001700            AMOD1A: BIS     @1700,(R1)+     ;SET ALL SLAVE TO NRZ,NORM,ODD
4622  022436  005111                            COM     (R1)
4623  022440  001402                            BEQ     AMOD1B          ;IF FILLED ALL SLAVES: BR
4624  022442  005111                            COM     (R1)
4625  022444  000772                            BR      AMOD1A          ;ELSE DO ALL
4626  022446  005111                    AMOD1B: COM     (R1)
4627  022450  004737  005174                    JSR     PC,RWNDA        ;GO REWIND ALL AVAIL SLAVES
4628  022454  012737  000006  000740            MOV     @6,ABLCNT       ;SET NUMBER OF BLOCKS FOR MODE 1
4629  022462  012737  174000  000556            MOV     @-4000,FMCNT    ;SET FC = 4000
4630  022470  012737  000100  000554            MOV     @100,RCNT       ;SET REC CNTR = 100
4631  022476  013737  000736  000550            MOV     ADRVN,DVN       ;SELECT DRIVE
4632  022504  012737  000001  000560            MOV     @1,PATRN        ;SELECT PATTERN 1
4633  022512  005037  000564                    CLR     TMEX            ;ASSURE NO TMK
4634  022516  005037  000566                    CLR     INTRF           ;ASSURE NORMAL READ
4635  022522  004737  003416                    JSR     PC,STAUTO       ;GO DO AUTO MODE 1
4636  022526  012737  000010  000560            MOV     @10,PATRN       ;SELECT PATTERN 10
4637  022534  004737  003416                    JSR     PC,STAUTO       ;GO DO PATTERN 10
4638  022540  012737  000014  000560            MOV     @14,PATRN       ;SELECT PATTERN 14
4639  022546  004737  003416                    JSR     PC,STAUTO
4640  022552  005737  000650                    TST     NRZOF           ;SEE IF NRZ ONLY
4641  022556  001411                            BEQ     AMOD1C          ;IF NOT: BR
4642  022560  012737  177777  000740            MOV     @-1,ABLCNT      ;FORCE TO EOT
4643  022566  012737  153624  000624            MOV     @153624,RANBAS
4644  022574  012737  032561  000626            MOV     @32561,RANSAV   ;RESET RANDOM DATA BASE
4645  022602  012737  177777  000560    AMOD1C: MOV     @-1,PATRN       ;SELECT AUTO RANDOM DATA
4646  022610  004737  003416                    JSR     PC,STAUTO
4647  022614  000207                            RTS     PC              ;RETURN TO SEQ
```

```
4648
4649                                    ;SUBROUTINE TO SELECT PE AUTO TEST MODE**********
4650
4651  022616  005737  003042          AMOD2:  TST     CHNFLG          ;**G BRANCH IF IN CHAIN MODE
4652  022622  001003                          BNE     1$              ;**G
4653  022624  005737  000650                  TST     NRZOF           ;SEE IF NRZ ONLY
4654  022630  001057                          BNE     AMOD2X          ;IF SO: BR
4655  022632  005037  000654          1$:     CLR     BLCNTR          ;CLEAR BLOCK CNTR
4656  022636  012701  000750                  MOV     #UN1,R1         ;SET START OF SLAVE TABLE
4657  022642  042711  001700          AMOD2A: BIC     #1700,(R1)      ;CLEAR NRZ
4658  022646  052721  002300                  BIS     #2300,(R1)+     ;SET TO PE NORM. ODD
4659  022652  005111                          COM     (R1)            ;SEE IF END OF TABLE
4660  022654  001402                          BEQ     AMOD2B          ;IF SO: BR
4661  022656  005111                          COM     (R1)
4662  022660  000770                          BR      AMOD2A          ;CONTINUE
4663  022662  005111          AMOD2B: COM     (R1)
4664  022664  004737  005174                  JSR     PC,RWNDA        ;REWIND ALL SLAVES
4665  022670  012737  000006  000740          MOV     #6,ABLCNT       ;SET AUTO BLOCK COUNT
4666  022676  012737  174000  000556          MOV     #-4000,FMCNT    ;SET FC = 4000
4667  022704  012737  000100  000554          MOV     #100,RCNT       ;SET REC CNTR TO 100
4668  022712  012737  000010  000560          MOV     #10,PATRN       ;SELECT PATTERN 10
4669  022720  004737  003416                  JSR     PC,STAUTO       ;GO DO AUTO SEQ
4670  022724  012737  000014  000560          MOV     #14,PATRN       ;SELECT PATTERN 14
4671  022732  004737  003416                  JSR     PC,STAUTO
4672  022736  012737  000015  000560          MOV     #15,PATRN       ;SELECT PATTERN 15
4673  022744  004737  003416                  JSR     PC,STAUTO
4674  022750  012737  177777  000740          MOV     #-1,ABLCNT      ;FORCE TO END OF TAPE
4675  022756  012737  177777  000560          MOV     #-1,PATRN       ;SELECT AUTO RANDOM DATA
4676  022764  004737  003416                  JSR     PC,STAUTO
4677  022770  000207          AMOD2X: RTS     PC              ;RETURN TO SEQ
4678
4679
```

```
                        ;************************************************************
                        ;ERROR HEADER PRINT SUBROUTINE:
                        ;
                        ;THIS ROUTINE IS USED TO PRINT OUT A HEADER
                        ;WITH EACH ERROR MESSAGE.  THE PRINT IS IN TWO
                        ;LINES AND CONTAINS THE FOLLOWING INFORMATION.
                        ;LINE 1:  DRIVE NO. SLAVE NO. DENSITY PARITY FORMAT
                        ;LINE 2:  CURRENT BLOCK NUMBER, RECORD NUMBER IN
                        ;WHICH THE ERROR OCCURED PLUS THE TOTAL NUMBER
                        ;OF RECORDS IN THIS BLOCK, THE RECORD SIZE (NUMBER
                        ;OF CHARACTERS), AND THE ERROR TYPE (READ,WRITE, SPACE, ETC)
                        ;PLUS THE TAPE DIRECTION (FORWARD OR REVERSE).
                        ;ALL NUMBERS ARE IN OCTAL.
                        ;************************************************************

022772  012704  025160        PAPRT:  MOV     #MSG12,R4
022776  104000                        TTOUTT                  ;PRINT DRIVE HEADER
023000  013703  000550                MOV     DVN,R3
023004  104002                        OCTPP                   ;PRINT DRIVE NUMBER
023006  012704  025144                MOV     #MSG11,R4
023012  104000                        TTOUTT                  ;PRINT UNIT HEADER
023014  013703  000552                MOV     UDES,R3
023020  042703  177770                BIC     #177770,R3
023024  104002                        OCTPP                   ;PRINT UNIT NUMBER
023026  012704  026371                MOV     #MSG60,R4
023032  104000                        TTOUTT                  ;PRINT DENSITY TAG
023034  013703  000552                MOV     UDES,R3
023040  000303                        SWAB    R3
023042  042703  177770                BIC     #177770,R3
023046  104002                        OCTPP                   ;PRINT DENSITY
023050  012704  026375                MOV     #MSG61,R4
023054  104000                        TTOUTT                  ;PRINT PARITY TAG
023056  005003                        CLR     R3
023060  032737  000010  000552        BIT     #10,UDES
023066  001402                        BEQ     PAPRTO
023070  012703  000001                MOV     #1,R3
023074  104002                PAPRTO: OCTPP                   ;PRINT PARITY
023076  012704  026401                MOV     #MSG62,R4
023102  104000                        TTOUTT                  ;PRINT FORMAT TAG
023104  013703  000552                MOV     UDES,R3
023110  000241                        CLC
023112  006003                        ROR     R3
023114  006003                        ROR     R3
023116  006003                        ROR     R3              ;PONTION FORMAT
023120  006003                        ROR     R3
023122  042703  177760                BIC     #177760,R3
023126  104002                        OCTPP                   ;PRINT FORMAT
023130  012704  025121                MOV     #MSG8,R4
023134  104000                        TTOUTT                  ;PRINT PATRN TAG
023136  032777  000400  155442        BIT     #400,@SWR       ;SEE IF RANDOM DATA
023144  001406                        BEQ     PAPRTB          ;IF NOT: BR
023146  012737  000122  000636PAPRTA: MOV     #122,TOB
023154  004737  023724                JSR     PC,TOG          ;PRINT R
023160  000411                        BR      PAPRTD
023162  005737  000734        PAPRTB: TST     ASEQF           ;SEE IF AUTO SEQ
```

```
 4736  023166  001403                          BEQ     PAPRTC          ;IF NOT: BR
 4737  023170  005737  000560                  TST     PATRN           ;SEE IF AUTO RANDOM
 4738  023174  100764                          BMI     PAPRTA          ;IF SO: BR
 4739  023176  013703  000560          PAPRTC: MOV     PATRN,R3
 4740  023202  104002                          OCTPP                   ;PRINT PATRN NUMBER
 4741  023204  012704  025174          PAPRTD: MOV     #MSG13,R4
 4742  023210  104000                          TTOUTT                  ;PRINT BLOCK NO. HEADER
 4743  023212  013703  000654                  MOV     BLCNTR,R3
 4744  023216  104002                          OCTPP                   ;PRINT NUMBER
 4745  023220  012704  025202                  MOV     #MSG14,R4
 4746  023224  104000                          TTOUTT                  ;PRINT REC NO. HEADER
 4747  023226  010003                          MOV     R0,R3
 4748  023230  032737  000010  000672          BIT     #10,MTC1        ;SEE IF WRITE OPERATION
 4749  023236  001404                          BEQ     PAPRT1          ;IF SO: BR
 4750  023240  032737  010000  000562          BIT     #10000,RDCMD    ;SEE IF READ REVERSE
 4751  023246  001016                          BNE     PAPRT3          ;IF SO: BR
 4752  023250  013703  000554          PAPRT1: MOV     RCNT,R3
 4753  023254  005737  000676                  TST     TMFLG           ;SEE IF TAPE MARK TIME
 4754  023260  001010                          BNE     PAPRT2          ;IF SO: BR
 4755  023262  022737  012262  000662          CMP     #81,RTRN
 4756  023270  001003                          BNE     PAPRTY          ;IF NOT BACK SPACE: BR
 4757  023272  005737  000712                  TST     RTYFL
 4758  023276  001402                          BEQ     PAPRT3          ;IF NOT RETRY: BR
 4759  023300  160003          PAPRTY: SUB     R0,R3                   ;GET RECORD NUMBER
 4760  023302  005203          PAPRT2: INC     R3
 4761  023304  104002          PAPRT3: OCTPP                           ;PRINT RECORD NUMBER
 4762  023306  012737  000055  000636          MOV     #55,TOB         ;LOAD DASH (-)
 4763  023314  004737  023724                  JSR     PC,TOG          ;PRINT DASH (-)
 4764  023320  013703  000554                  MOV     RCNT,R3
 4765  023324  104002                          OCTPP                   ;PRINT RECORD COUNT
 4766  023326  012704  025114                  MOV     #MSG7,R4
 4767  023332  104000                          TTOUTT                  ;PRINT RECORD SIZE HEADER
 4768  023334  013703  000556                  MOV     FMCNT,R3        ;GET CHARACTER COUNT
 4769  023340  005303                          DEC     R3
 4770  023342  005103                          COM     R3              ;REMOVE TWOS COMPLEMENT
 4771  023344  104002                          OCTPP                   ;PRINT RECORD SIZE
 4772  023346  012737  000001  000664          MOV     #1,HDRFL        ;SET HEADER FLAG
 4773  023354  000207                          RTS     PC              ;RETURN
 4774
```

```
4775
4776                                    ;*************************************************************
4777                                    ;RANDOM NUMBER GENERATOR SUBROUTINE:
4778                                    ;
4779                                    ;THIS SUBROUTINE IS USED TO GENERATE THE RANDOM
4780                                    ;NUMBERS REQUIRED FOR USE AS RANDOM DATA,
4781                                    ;RECORD COUNT, AND CHARACTER COUNT.
4782                                    ;*************************************************************
4783
4784  023356  063737  000626  000624  RANG:   ADD     RANSAV,RANBAS
4785  023364  063737  000624  000626          ADD     RANBAS,RANSAV   ;GET NEW NUMBER
4786  023372  023701  000626                  CMP     RANSAV,R1       ;SEE IF NUMBER TOO BIG
4787  023376  101367                          BMI     RANG            ;IF SO: BR
4788  023400  020237  000626                  CMP     R2,RANSAV       ;SEE IF NUMBER TOO SMALL
4789  023404  101364                          BMI     RANG            ;IF SO: BR
4790  023406  000207                          RTS     PC              ;EXIT
4791
```

```
                                ;*************************************************************
                                ;TTY ENTRY SUBROUTINE:
                                ;
                                ;THIS SUBROUTINE IS USED BY THE TEST CONDITION
                                ;ENTRY ROUTINE TO READ THE RESPONSE ENTERED
                                ;AT THE TTY AND CHECK THEM FOR LEGALITY AND
                                ;LIMITS.  ALL RESPONSE MUST BE TYPED IN OCTAL
                                ;(0-7) AND MUST FALL WITHIN THE LIMITS SET BY
                                ;THE CALLING ROUTINE.
                                ;IF AN ENTRY IS ILLEGAL OR OUTSIDE THE LIMITS,
                                ;A QUESTION MARK IS TYPED (?) AND THE RESPONSE
                                ;MAY BE REENTERED.
                                ;ENTRIES MAY NOT EXCEED SIX (6) CHARACTERS AND
                                ;MAY BE TERMINATED AT LESS THAN SIX BY TYPING A
                                ;CARRIAGE RETURN
                                ;*************************************************************

023410  005037  000642        TTR:    CLR     TEMP1           ;CLEAR FIRST CHARACTER FLAG
023414  005000                        CLR     R0
023416  104010                TTR0:   TTINN                   ;GO READ CHARACTER
023420  122737  000015  000640        CMPB    #15,TIB         ;••G SEE IF CR
023426  001004                        BNE     TTR1            ;IF NOT: BR
023430  005737  000642                TST     TEMP1           ;SEE IF FIRST CHARACTER
023434  001436                        BEQ     TTR5            ;IF SO: BR
023436  000426                        BR      TTR2            ;••G ELSE GO LOAD VALUE
023440  122737  000060  000640  TTR1: CMPB    #60,TIB         ;••G SEE IF CHAR IS LESS THAN 0
023446  101401                        BLOS    TTR1A           ;IF NOT: BR
023450  000431                        BR      TINER           ;••G ELSE GO TO ERROR
023452  122737  000070  000640  TTR1A:CMPB    #70,TIB         ;••G SEE IF CHAR IS GREATER THAN 7
023460  101001                        BHI     TTR1B           ;IF NOT: BR
023462  000424                        BR      TINER           ;••G ELSE GO TO ERROR
023464  005237  000642        TTR1B:  INC     TEMP1           ;SET FIRST CHARACTER FLAG
023470  006300                        ASL     R0
023472  006300                        ASL     R0              ;SHIFT 3 LEFT
023474  006300                        ASL     R0
023476  042737  177770  000640        BIC     #177770,TIB     ;STRIP ASCII
023504  053700  000640                BIS     TIB,R0          ;LOAD CHARACTER
023510  005301                        DEC     R1              ;SEE IF DONE
023512  001341                        BNE     TTR0            ;IF NOT: BR
023514  020002                TTR2:   CMP     R0,R2           ;SEE IF EXCEEDED MAXIMUM LIMIT
023516  101401                        BLOS    TTR3            ;IF NOT: BR
023520  000405                        BR      TINER           ;••G ELSE GO TO ERROR
023522  020300                TTR3:   CMP     R3,R0           ;SEE IF BELOW MINIMUM LIMIT
023524  101401                        BLOS    TTR4            ;IF NOT: BR
023526  000402                        BR      TINER           ;••G ELSE GO TO ERROR
023530  010015                TTR4:   MOV     R0,(R5)         ;LOAD VALUE
023532  000207                TTR5:   RTS     PC              ;EXIT
023534  012704  026103        TINER:  MOV     #MSG43,R4
023540  104000                        TTOUTT                  ;PRINT?
023542  162716  000020                SUB     #20,(SP)        ;RESET SP TO START OF VALUE ROUTINE
023546  000207                        RTS     PC              ;REDO VALUE ENTRY
```

```
                                        ;TTY READ SUBROUTINE**********
                                
023550  005277  155034          TTIN:   INC     @TKS
023554  105777  155030          TTIN1:  TSTB    @TKS
023560  100375                  BPL     TTIN1
023562  017737  155024  000640          MOV     @TKB,TIB
023570  042737  000200  000640          BIC     #200,TIB        ;**G STRIP PARITY BIT
023576  105777  155012          TTIN2:  TSTB    @TPS
023602  100375                  BPL     TTIN2
023604  113777  000640  155004          MOVB    TIB,@TPB
023612  000207                  RTS     PC
                                
                                        ;TTY OUTPUT SUBROUTINE***********
                                
023614  112437  000636          TTOUT:  MOVB    (R4)+,TOB
023620  122737  000043  000636          CMPB    #43,TOB
023626  001476                  BEQ     TEX
023630  122737  000045  000636          CMPB    #45,TOB
023636  001407                  BEQ     TCRLF
023640  122737  000041  000636          CMPB    #41,TOB
023646  001467                  BEQ     TBELL           ;DO BELL
023650  004737  023724                  JSR     PC,TOG
023654  000757                  BR      TTOUT
023656  112737  000015  000636  TCRLF:  MOVB    #15,TOB
023664  004737  023724                  JSR     PC,TOG
023670  012703  000006                  MOV     #6,R3
023674  005037  000636          TCRLFA: CLR     TOB
023700  004737  023724                  JSR     PC,TOG
023704  005303                  DEC     R3
023706  001372                  BNE     TCRLFA          ;DO FILLERS
023710  112737  000012  000636          MOVB    #12,TOB
023716  004737  023724                  JSR     PC,TOG
023722  000734                  BR      TTOUT
                                
023724  105777  154660          TOG:    TSTB    @TKS            ;*JH SEE IF INPUT AT KEYBOARD
023730  100024                  BPL     3$              ;*JH BRANCH IF NOT
023732  117737  154654  000747          MOVB    @TKB,$CTRLS+1   ;*JH MOVE CHARACTER INTO BUFFER
023740  142737  000200  000747          BICB    #200,$CTRLS+1   ;*JH AND CLEAR PARITY BIT.
023746  122737  000023  000747          CMPB    #23,$CTRLS+1    ;*JH SEE IF CHARACTER IS XOFF (^S)
023754  001004                  BNE     2$              ;*JH BRANCH IF NOT
023756  112737  000377  000746          MOVB    #377,$CTRLS     ;*JH ELSE SET XOFF FLAG
023764  000757                  BR      TOG             ;*JH AND KEEP CHECKING FOR XON
023766  122737  000021  000747  2$:     CMPB    #21,$CTRLS+1    ;*JH SEE IF CHARACTER IS XON (^Q)
023774  001002                  BNE     3$              ;*JH BRANCH IF NOT
023776  105037  000746                  CLRB    $CTRLS          ;*JH ELSE CLEAR XOFF FLAG
024002  105737  000746          3$:     TSTB    $CTRLS          ;*JH SEE IF WE'RE IN XON MODE
024006  100746                  BMI     TOG             ;*JH BRANCH IF NOT
024010  105777  154600                  TSTB    @TPS
024014  100343                  BPL     TOG
024016  113777  000636  154572          MOVB    TOB,@TPB
024024  000207                  TEX:    RTS     PC
024026  012703  000002          TBELL:  MOV     #2,R3
024032  012737  000007  000636  TBELA:  MOV     #7,TOB
024040  004737  023724                  JSR     PC,TOG
024044  005303                  DEC     R3
```

E9


```
 4899  024046  001371                        BNE     TBEL A
 4900  024050  000661                        BR      TTOL'T
 4901
 4902
```

E8

F9


```
4903                                        ;OCTAL OUTPUT SUBROUTINE************
4904
4905  024052  005037  024304        OCTP:   CLR     OFL             ;CLEAR FLAG FOR LEADING ZERO
4906  024056  000403                        BR      OCTPE1
4907  024060  012737  000001  024304 OCTPE:  MOV     #1,OFL
4908  024066  010304                OCTPE1: MOV     R3,R4           ;SEE IF NUMBER IS ZERO
4909  024070  001006                        BNE     OCTPO           ;IF NOT ZERO: BR
4910  024072  005737  024304                TST     OFL
4911  024076  001003                        BNE     OCTPO
4912  024100  004737  024264                JSR     PC,OCTPG1       ;ELSE PRINT ZERO
4913  024104  000450                        BR      OCTP3           ;++G SPACE AND EXIT
4914  024106  032704  100000        OCTPO:  BIT     #100000,R4      ;SEE IF MSD = 1
4915  024112  001406                        BEQ     OCTP1           ;IF NOT: BR
4916  024114  012704  000001                MOV     #1,R4
4917  024120  004737  024242                JSR     PC,OCTPG        ;PRINT 1
4918  024124  000137  024136                JMP     OCTP2
4919  024130  005004                OCTP1:  CLR     R4
4920  024132  004737  024242                JSR     PC,OCTPG        ;PRINT 0
4921  024136  010304                OCTP2:  MOV     R3,R4
4922  024140  006004                        ROR     R4
4923  024142  006004                        ROR     R4
4924  024144  006004                        ROR     R4              ;POSITION DIGIT
4925  024146  006004                        ROR     R4
4926  024150  000304                        SWAB    R4
4927  024152  004737  024242                JSR     PC,OCTPG        ;PRINT DIGIT 2
4928  024156  010304                        MOV     R3,R4
4929  024160  006004                        ROR     R4
4930  024162  000304                        SWAB    R4
4931  024164  004737  024242                JSR     PC,OCTPG        ;PRINT DIGIT 3
4932  024170  010304                        MOV     R3,R4
4933  024172  006104                        ROL     R4
4934  024174  006104                        ROL     R4
4935  024176  000304                        SWAB    R4
4936  024200  004737  024242                JSR     PC,OCTPG        ;PRINT DIGIT 4
4937  024204  010304                        MOV     R3,R4
4938  024206  006004                        ROR     R4
4939  024210  006004                        ROR     R4
4940  024212  006004                        ROR     R4
4941  024214  004737  024242                JSR     PC,OCTPG
4942  024220  010304                        MOV     R3,R4
4943  024222  004737  024242                JSR     PC,OCTPG        ;PRINT DIGIT 5
4944  024226  012737  000240  000636 OCTP3:  MOV     #240,TOB
4945  024234  004737  023724                JSR     PC,TOG          ;PRINT SPACE
4946  024240  000207                        RTS     PC              ;EXIT
4947  024242  042704  177770        OCTPG:  BIC     #177770,R4
4948  024246  001004                        BNE     OCTPGO
4949  024250  005737  024304                TST     OFL
4950  024254  001001                        BNE     OCTPGO
4951  024256  000207                        RTS     PC
4952  024260  005237  024304        OCTPGO: INC     OFL
4953  024264  052704  000260        OCTPG1: BIS     #260,R4
4954  024270  010437  000636                MOV     R4,TOB
4955  024274  004737  023724                JSR     PC,TOG
4956  024300  010304                        MOV     R3,R4
4957  024302  000207                        RTS     PC
4958  024304  000000                OFL:    0                       ;FIRST CHAR FLAG
```

F9

```
4959
4960                                    ;DATA CHARACTER OUTPUT SUBROUTINE**********
4961
4962  024306  005037  000636        DOUT:  CLR     TOB
4963  024312  012704  000010               MOV     #10,R4          ;SET NUMBER TO PRINT
4964  024316  110337  000636               MOVB    R3,TOB
4965  024322  105777  154266        DOUT1: TSTB    @TPS
4966  024326  100375                       BPL     DOUT1
4967  024330  132737  000200  000636       BITB    #200,TOB
4968  024336  105737  000636               TSTB    TOB             ;**G
4969  024342  100004                       BPL     DOUT2           ;**G
4970  024344  012777  000061  154244       MOV     #061,@TPB
4971  024352  000403                       BR      DOUT3
4972  024354  012777  000060  154234 DOUT2: MOV     #060,@TPB
4973  024362  006137  000636        DOUT3: ROL     TOB
4974  024366  005304                       DEC     R4
4975  024370  001354                       BNE     DOUT1
4976  024372  000207                       RTS     PC
4977  024374  013703  000646        DOUTD: MOV     TEMP3,R3
4978  024400  000303                       SWAB    R3
4979  024402  004737  024306               JSR     PC,DOUT
4980  024406  013703  000646               MOV     TEMP3,R3
4981  024412  004737  024306               JSR     PC,DOUT
4982  024416  000207                       RTS     PC
4983
4984                                    ;**G TU16/TE16 SERIAL NUMBER PRINT SUBROUTINE*******
4985
4986  024420  010304        SNPT:  MOV     R3,R4
4987  024422  000304               SWAB    R4
4988  024424  006004               ROR     R4
4989  024426  006004               ROR     R4
4990  024430  006004               ROR     R4
4991  024432  006004               ROR     R4
4992  024434  004737  024476       JSR     PC,SNPG         ;PRINT FIRST DIGIT
4993  024440  010304               MOV     R3,R4
4994  024442  000304               SWAB    R4
4995  024444  004737  024476       JSR     PC,SNPG         ;PRINT SECOND DIGIT
4996  024450  010304               MOV     R3,R4
4997  024452  006004               ROR     R4
4998  024454  006004               ROR     R4
4999  024456  006004               ROR     R4
5000  024460  006004               ROR     R4
5001  024462  004737  024476       JSR     PC,SNPG         ;PRINT THIRD DIGIT
5002  024466  010304               MOV     R3,R4
5003  024470  004737  024476       JSR     PC,SNPG         ;PRINT FOURTH DIGIT
5004  024474  000207               RTS     PC              ;EXIT
5005  024476  012737  000260  000636 SNPG: MOV     #260,TOB        ;SET NUMBER BASE
5006  024504  042704  177760               BIC     #177760,R4      ;MASK NUMBER
5007  024510  050437  000636               BIS     R4,TOB          ;BUILD DIGIT
5008  024514  004737  023724               JSR     PC,TOG          ;GO TYPE
5009  024520  000207                       RTS     PC              ;RETURN
5010
5011
5012                                    ;CHECK SWITCH REGISTER ROUTINE. CHECKS FOR ↑G TO ALLOW CHANGING
5013                                    ;OF LOC.176.
5014                                    ;CALL IS BY WAY OF CKSWRR
```

```
                                        ;LOCATIONS USED:
024522 000000                           TEMPST: .WORD   0
024524 000000                           COUNT:  .WORD   0
024526 000000                           RDSW:   .WORD   0
024530 022737 000176 000606 CKSWR:      CMP     @#SWREG,SWR             ;SOFTWARE SWITCH REG PRESENT
024536 001123                           BNE     OUT                     ;NO, GET OUT
024540 105777 154044                    TSTB    @TKS                    ;YES,WAIT FOR
024544 100120                           BPL     OUT                     ;READY, GET CHARACTER
024546 017737 154040 000640             MOV     @TKB,TIB                ;AND STRIP OFF
024554 042737 177600 000640             BIC     #177600,TIB             ;THE GARBAGE
024562 022737 000007 000640             CMP     #7,TIB          ;IS IT A <↑G>
024570 001106                           BNE     OUT
024572 012704 027556        CNTG:       MOV     #$CNTG,R4
024576 104000                           TTOUTT
024600 012704 027562        CNTLU:      MOV     #$MSWR,R4
024604 104000                           TTOUTT
024606 017703 153774                    MOV     @SWR,R3
024612 004737 024060                    JSR     PC,OCTPE
024616 012704 027571                    MOV     #$MNEW,R4
024622 104000                           TTOUTT
024624 005037 024522        $READ:      CLR     TEMPST
024630 012737 000007 024524             MOV     #7,COUNT
024636 104010               1$:         TTINN                   ;GO  READ A CHARACTER
024640 122737 000025 000640             CMPB    #25,TIB         ;IS IT A ↑U?
024646 001001                           BNE     2$              ;BRANCH IF NOT
024650 000753               3$:         BR CNTLU                ;START OVER
024652 122737 000015 000640 2$:         CMPB    #15,TIB         ;IS IT A <CR>?
024660 001013                           BNE     4$              ;BRANCH IF NOT
024662 012737 000200 024526             MOV     #200,RDSW
024670 012704 027601                    MOV     #MCRLF,R4
024674 104000                           TTOUTT
024676 022737 000007 024524             CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
024704 001035                           BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
024706 000437                           BR      OUT             ;GET OUT
024710 122737 000060 000640 4$:         CMPB    #60,TIB
024716 003004                           BGT     5$
024720 122737 000067 000640             CMPB    #67,TIB
024726 002004                           BGE     6$
024730 012704 026103        5$:         MOV     #MSG43,R4
024734 104000                           TTOUTT
024736 000744                           BR      3$              ;START OVER IF NOT LEGAL CHARACTER
024740 006337 024522        6$:         ASL     TEMPST
024744 006337 024522                    ASL     TEMPST
024750 006337 024522                    ASL     TEMPST
024754 142737 000060 000640             BICB    #60,TIB         ;GET NITTY-GRITTY
024762 153737 000640 024522             BISB    TIB,TEMPST
024770 005337 024524                    DEC     COUNT           ;ONLY WANT 6   DIGITS
024774 001755                           BEQ     5$
024776 000717                           BR      1$
025000 013777 024522 153600 7$:         MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
025006 000207               OUT:        RTS     PC              ;RETURN TO BODY OF PROGRAM
                                        ;HALT HANDLER**********

025010 000000               STOP:       HALT
025012 104004                           CKSWRR                  ;CHECK FOR CONTROL G
025014 000207                           RTS     PC
```

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 5071
 5072
 5073                                        ;TRAP HANDLER**************
 5074
 5075  025016  016677  000002  153560  TRAP30: MOV     2(6),@PSW       ;ADJUST PSW
 5076  025024  011666  000002                 MOV     @SP,2(6)        ;PLACE RETURN ADDRESS OVER PSW
 5077  025030  162716  000002                 SUB     #2,@SP          ;SUB. 2 FROM RETURN ADDRESS
 5078  025034  013646                         MOV     @(6)+,-(6)
 5079  025036  062716  121044                 ADD     #TABLE-104000,@SP       ;GET SUBROUTINE STARTING ADDRESS
 5080  025042  013607                         MOV     @(SP)+,PC       ;GO TO SUBROUTINE
 5081  025044  023614                 TABLE:  TTOUT
 5082  025046  024052                         OCTP
 5083  025050  024530                         CKSWR
 5084  025052  025010                         STOP
 5085  025054  023550                         TTIN
 5086          104000                 TTOUTT= 104000
 5087          104002                 OCTPP=  104002
 5088          104004                 CKSWRR= 104004
 5089          104006                 STOPP=  104006
 5090          104010                 TTINN=  104010
 5091
```

J9


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5092
5093                                    ;ERROR MESSAGES***********
5094
5095  025056  042052  020105     043  MSG1:   .ASCII  /*DE #/
5096
5097  025063     045  035507  021440  MSG2:   .ASCII  /%G; #/
5098
5099  025070  041045  020073     043  MSG3:   .ASCII  /%B; #/
5100
5101  025075     045  047103  021440  MSG4:   .ASCII  /%CN #/
5102
5103  025102  053452  020105     043  MSG5:   .ASCII  /*WE #/
5104
5105  025107     052  042522  021440  MSG6:   .ASCII  /*RE #/
5106
5107  025114  051052  020123     043  MSG7:   .ASCII  /*RS #/
5108
5109  025121     052  040520  051124  MSG8:   .ASCII  /*PATRN #/
5110  025126  020116     043
5111  025131     040  047123  020072  MSG9:   .ASCII  / SN: #/
5112  025136     043
5113  025137     052  042523  021440  MSG10:  .ASCII  /*SE #/
5114
5115  025144  051452  040514  042526  MSG11:  .ASCII  /*SLAVE NO. #/
5116  025152  047040  027117  021440
5117
5118  025160  042045  044522  042526  MSG12:  .ASCII  /%DRIVE NO. #/
5119  025166  047040  027117  021440
5120
5121  025174  025045  047102  021440  MSG13:  .ASCII  /%*BN #/
5122
5123  025202  051052  020116     043  MSG14:  .ASCII  /*RN #/
5124
5125  025207     045  020041  020040  MSG15:  .ASCII  /%!          BAD RECORD%%#/
5126  025214  020040  020040  020040
5127  025222  041040  042101  051040
5128  025230  041505  051117  022504
5129  025236  021445
5130
5131  025240  043040     043          MSG16:  .ASCII  / F#/
5132
5133  025243     040  021522          MSG17:  .ASCII  / R#/
5134
5135  025246  020041  047505  020124  MSG20:  .ASCII  /! EOT NO: #/
5136  025254  047516  020072     043
5137
5138
5139  025261     045  047111  042524  MSG21:  .ASCII  /%INTERCHANGE READ = #/
5140  025266  041522  040510  043516
5141  025274  020105  042522  042101
5142  025302  036440  021440
5143
5144  025306  020445  046111  042514  MSG22:  .ASCII  /%!ILLEGAL BOT: HALT%#/
5145  025314  040507  020114  047502
5146  025322  035124  044040  046101
5147  025330  022524     043
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K9

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5148
5149  025333     045  051503  020061  MSG23:  .ASCII  /%CS1 #/
5150  025340     043
5151
5152  025341     045  041527  021440  MSG23A: .ASCII  /%WC #/
5153
5154  025346  041045  020101     043  MSG23B: .ASCII  /%BA #/
5155
5156  025353     045  041506  021440  MSG23C: .ASCII  /%FC #/
5157
5158  025360  041445  031123  021440  MSG23D: .ASCII  /%CS2 #/
5159
5160  025366  042045  020123     043  MSG23E: .ASCII  /%DS #/
5161
5162  025373     045  051105  021440  MSG23F: .ASCII  /%ER #/
5163
5164  025400  040445  020123     043  MSG23G: .ASCII  /%AS #/
5165
5166  025405     045  045503  021440  MSG23H: .ASCII  /%CK #/
5167
5168  025412  042045  020102     043  MSG23I: .ASCII  /%DB #/
5169
5170  025417     045  051115  021440  MSG23J: .ASCII  /%MR #/
5171
5172  025424  042045  020124     043  MSG23K: .ASCII  /%DT #/
5173
5174  025431     045  041524  021440  MSG23L: .ASCII  /%TC #/
5175
5176  025436  051445  020116     043  MSG23M: .ASCII  /%SN #/
5177
5178  025443     045  047041  020117  MSG24:  .ASCII  /%!NO INTERRUPT%#/
5179  025450  047111  042524  051122
5180  025456  050125  022524     043
5181
5182  025463     045  047041  020117  MSG25:  .ASCII  /%!NO MOL: HALT%#/
5183  025470  047515  035114  044040
5184  025476  046101  022524     043
5185
5186  025503     045  051104  050117  MSG26:  .ASCII  /%DROPS: #/
5187  025510  035123  021440
5188
5189  025514  050045  041511  051513  MSG27:  .ASCII  /%PICKS: #/
5190  025522  020072     043
5191
5192  025525     045     043          MSG28:  .ASCII  /%#/
5193  025527     045  052045  030115  MSG30:  .ASCII  '%%TM02-TU16/TE16 AUTO SEQUENCE (CZTUAJO)%#'     ;↔↔G
5194  025534  026462  052524  033061
5195  025542  052057  030505  020066
5196  025550  052501  047524  051440
5197  025556  050505  042525  041516
5198  025564  020105  041450  052132
5199  025572  040525  030112  022451
5200  025600     043
5201  025601     045  041445  052132  MSG31:  .ASCII  '%%CZTUAJO TM02-TU16/TE16 RELIAB%%#'
5202  025606  040525  030112  052040
5203  025614  030115  026462  052524
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 5204  025622  033061  052057  030505
 5205  025630  020066  042522  044514
 5206  025636  041101  022445     043
 5207
 5208  025643     045  046123  053101  MSG32:  .ASCII  /%SLAVE NUMBER = @/
 5209  025650  020105  052516  041115
 5210  025656  051105  036440  021440
 5211
 5212  025664  042045  047105  044523  MSG33:  .ASCII  /%DENSITY = @/
 5213  025672  054524  036440  021440
 5214
 5215  025700  050045  051101  052111  MSG34:  .ASCII  /%PARITY = @/
 5216  025706  020131  020075     043
 5217
 5218  025713     045  042522  047503  MSG35:  .ASCII  /%RECORD COUNT = @/
 5219  025720  042122  041440  052517
 5220  025726  052116  036440  021440
 5221
 5222  025734  041445  040510  040522  MSG36:  .ASCII  /%CHARACTER COUNT = @/
 5223  025742  052103  051105  041440
 5224  025750  052517  052116  036440
 5225  025756  021440
 5226
 5227  025760  050045  052101  042524  MSG37:  .ASCII  /%PATTERN NUMBER = @/
 5228  025766  047122  047040  046525
 5229  025774  042502  020122  020075
 5230  026002     043
 5231  026003     045  044523  043516  MSG38:  .ASCII  /%SINGLE PASS = @/
 5232  026010  042514  050040  051501
 5233  026016  020123  020075     043
 5234  026023     045  047105  042524  MSG40:  .ASCII  /%ENTER STALLS%READ = @/
 5235  026030  020122  052123  046101
 5236  026036  051514  051045  040505
 5237  026044  020104  020075     043
 5238
 5239  026051     045  051127  052111  MSG41:  .ASCII  /%WRITE = @/
 5240  026056  020105  020075     043
 5241
 5242  026063     045  052524  047122  MSG42:  .ASCII  /%TURN AROUND = @/
 5243  026070  040440  047522  047125
 5244  026076  020104  020075     043
 5245
 5246  026103     045  022477     043  MSG43:  .ASCII  /%?%@/
 5247
 5248  026107     045  047105  042524  MSG44:  .ASCII  /%ENTER YOZZLE STALL = @/
 5249  026114  020122  047531  055132
 5250  026122  042514  051440  040524
 5251  026130  046114  036440  021440
 5252
 5253  026136  042445  051122  040440  MSG45:  .ASCII  /%ERR AMT @/
 5254  026144  052115  021440
 5255
 5256  026150  043045  020103     043  MSG46:  .ASCII  /%FC @/
 5257
 5258  026155     045  040503  021440  MSG47:  .ASCII  /%CA @/
 5259
```

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 5260  026162  020445  047516  041040  MSG48:  .ASCII  /%!NO BOT ON REWIND: HALT%@/
 5261  026170  052117  047440  020116
 5262  026176  042522  044527  042116
 5263  026204  020072  040510  052114
 5264  026212  021445
 5265
 5266  026214  047040  052117  040440  MSG49:  .ASCII  / NOT AVAIL @/
 5267  026222  040526  046111  021440
 5268  026230  044440  046114  043505  MSG50:  .ASCII  / ILLEGAL DRIVE TYPE @/
 5269  026236  046101  042040  044522
 5270  026244  042526  052040  050131
 5271  026252  020105     043
 5272  026255     045  042045  044522  MSG52:  .ASCII  /%%DRIVE NUMBER = @/
 5273  026262  042526  047040  046525
 5274  026270  042502  020122  020075
 5275  026276     043
 5276
 5277  026277     045  047506  046522  MSG53:  .ASCII  /%FORMAT = @/
 5278  026304  052101  036440  021440
 5279
 5280  026312  053452  020105  046524  MSG54:  .ASCII  /*WE TM@/
 5281  026320     043
 5282
 5283  026321     052  042523  052040  MSG55:  .ASCII  /*SE TM@/
 5284  026326  021515
 5285
 5286  026330  052040  021515          MSG56:  .ASCII  / TM@/
 5287
 5288  026334  047040  047117  042455  MSG57:  .ASCII  / NON-EXIST SLAVE@/
 5289  026342  044530  052123  051440
 5290  026350  040514  042526     043
 5291  026355     045  051103  020103  MSG58:  .ASCII  /%CRC @/
 5292  026362     043
 5293  026363     045  051114  020103  MSG59:  .ASCII  /%LRC @/
 5294  026370     043
 5295  026371     052  020104     043  MSG60:  .ASCII  /*D @/
 5296  026375     052  020120     043  MSG61:  .ASCII  /*P @/
 5297  026401     052  020106     043  MSG62:  .ASCII  /*F @/
 5298
 5299  026405     045  047452  044522  MSG64:  .ASCII  /%*ORIGINAL ERROR*@/
 5300  026412  044507  040516  020114
 5301  026420  051105  047522  025122
 5302  026426     043
 5303
 5304  026427     045  042522  051124  MSG65:  .ASCII  /%RETRY: @/
 5305  026434  035131  021440
 5306
 5307  026440  020452  042523  051040  MSG66:  .ASCII  /*!SE RTRY @/
 5308  026446  051124  020131     043
 5309
 5310  026453     052  042441  040522  MSG67:  .ASCII  /*!ERASE@/
 5311  026460  042523     043
 5312
 5313  026463     045  042522  042522  MSG68:  .ASCII  /%REREV: @/
 5314  026470  035126  021440
 5315  026474  052045  050101  020105  MSG69:  .ASCII  /%TAPE MARK = @/
```

```
 5316  026502  040515  045522  036440
 5317  026510  021440
 5318
 5319  026512  020445  047516  042040  MSG70:  .ASCII  /%!NO DRY FROM REWIND: HALT%#/
 5320  026520  054522  043040  047522
 5321  026526  020115  042522  044527
 5322  026534  042116  020072  040510
 5323  026542  052114  021445
 5324  026546  047040  047117  042455  MSG71:  .ASCII  / NON-EXIST DRIVE#/
 5325  026554  044530  052123  042040
 5326  026562  044522  042526     043
 5327  026567     045  042522  053506  MSG72:  .ASCII  /%REFWD: #/
 5328  026574  035104  021440
 5329  026600  053445  042524  051122  MSG73:  .ASCII  /%WTERR: #/
 5330  026606  020072     043
 5331  026611     045  042522  044507  MSG74:  .ASCII  /%REGISTER START = #/
 5332  026616  052123  051105  051440
 5333  026624  040524  052122  036440
 5334  026632  021440
 5335  026634  053045  041505  047524  MSG75:  .ASCII  /%VECTOR = #/
 5336  026642  020122  020075     043
 5337  026647     045  042504  042522  MSG76:  .ASCII  /%DEREV: #/
 5338  026654  035126  021440
 5339  026660  042045  043105  042127  MSG77:  .ASCII  /%DEFWD: #/
 5340  026666  020072     043
 5341  026671     045  047041  047117  MSG78:  .ASCII  /%!NON-RETRYABLE WRITE ERROR: ER #/
 5342  026676  051055  052105  054522
 5343  026704  041101  042514  053440
 5344  026712  044522  042524  042440
 5345  026720  051122  051117  020072
 5346  026726  051105  021440
 5347  026732  020445  047516  026516  MSG79:  .ASCII  /%!NON-RETRYABLE READ ERROR: ER #/
 5348  026740  042522  051124  040531
 5349  026746  046102  020105  042522
 5350  026754  042101  042440  051122
 5351  026762  051117  020072  051105
 5352  026770  021440
 5353  026772  020445  042441  042116  MSG100: .ASCII  /%!!END OF PASS %#/
 5354  027000  047440  020106  040520
 5355  027006  051523  022440     043
 5356  027013     045  025052  025052  MSG101: .ASCII  /%**********%#/
 5357  027020  025052  025052  022452
 5358  027026     043
 5359  027027     052  046524  031060  MSG102: .ASCII  /*TM02 #/
 5360  027034  021440
 5361  027036  051452  040514  042526  MSG103: .ASCII  /*SLAVES #/
 5362  027044  020123     043
 5363  027047     045  052501  047524  MSG104: .ASCII  /%AUTO CONT: #/
 5364  027054  041440  047117  035124
 5365  027062  021440
 5366  027064  051045  041505  053117  MSG105: .ASCII  /%RECOVERED#/
 5367  027072  051105  042105     043
 5368  027077     052  020441  040502  MSG106: .ASCII  /*!!BAD TAPE OVERFLOW#/
 5369  027104  020104  040524  042520
 5370  027112  047440  042526  043122
 5371  027120  047514  021527
```

```
5372  027124  051045  053505  047111  MSG16A: .ASCII  /<CR>REWIND TAPE; RESTART AT BLOCK ONE<0>/
5373  027132  020104  040524  042520
5374  027140  020073  042522  052123
5375  027146  051101  020124  052101
5376  027154  041040  047514  045503
5377  027162  047440  042516    043
5378  027167     045  020441  047125  MSG107: .ASCII  /<CR>!!UNRECOVERABLE BAD SPOT/
5379  027174  042522  047503  042526
5380  027202  040522  046102  020105
5381  027210  040502  020104  050123
5382  027216  052117
5383  027220  041045  042101  051040          .ASCII  /<CR>BAD RECORD LEFT ON TAPE<CR><0>/
5384  027226  041505  051117  020104
5385  027234  042514  052106  047440
5386  027242  020116  040524  042520
5387  027250  021445
5388  027252  047045  055122  047440  MSG108: .ASCII  /<CR>NRZ ONLY: <0>/
5389  027260  046116  035131  021440
5390  027266  020452  050041  051517  MSG109: .ASCII  /<LF>!!POSITION LOST IN RETRY<0>/
5391  027274  052111  047511  020116
5392  027302  047514  052123  044440
5393  027310  020116  042522  051124
5394  027316  021531
5395  027320  051445  051525  042520  MSG110: .ASCII  /<CR>SUSPECT BAD TAPE<0>/
5396  027326  052103  041040  042101
5397  027334  052040  050101  021505
5398  027342  051045  050105  040505  MSG111: .ASCII  /<CR>REPEAT: <0>/
5399  027350  035124  021440
5400  027354  041040  042101  052040  MSG112: .ASCII  / BAD TAPE SPOTS<CR><0>/
5401  027362  050101  020105  050123
5402  027370  052117  022523    043
5403
5404  027375     045  051440  043117  MSG113: .ASCII  /<CR> SOFT: <0>/
5405  027402  035124  021440
5406
5407  027406  020045  040510  042122  MSG114: .ASCII  /<CR> HARD: <0>/
5408  027414  020072    043
5409
5410  027417     045  020441  040510  MSG115: .ASCII  /<CR>!!HARD READ ERROR<0>/
5411  027424  042122  051040  040505
5412  027432  020104  051105  047522
5413  027440  021522
5414  027442  020445  047125  052111  MSG116: .ASCII  /<CR>!UNIT REWINDING: TEST WILL START AT BOT<0>/
5415  027450  051040  053505  047111
5416  027456  044504  043516  020072
5417  027464  042524  052123  053440
5418  027472  046111  020114  052123
5419  027500  051101  020124  052101
5420  027506  041040  052117    043
5421  027513     045  042522  047515  MSG120: .ASCII  /<CR>REMOVE TMDP FROM UNIT UNDER TEST<CR><0>/
5422  027520  042526  052040  042115
5423  027526  020120  051106  046517
5424  027534  052440  044516  020124
5425  027542  047125  042504  020122
5426  027550  042524  052123  021445
5427  027556  057045  021507          $CNTG:  .ASCII  /<CR>^G<0>/
```

```
 5428  027562  051445  051127  020075  $MSWR:  .ASCII  /%SWR= 0/
 5429  027570     043
 5430  027571     040  047040  053505  $MNEW:  .ASCII  /  NEW= 0/
 5431  027576  020075     043
 5432  027601     045     043          MCRLF:  .ASCII  /%0/
 5433
 5434          027604                          .EVEN
 5435  027604  000000                  WDATA:  0                       ;WRITE BUFFER
 5436
 5437          033612                          .=.+4004
 5438  033612  000000                  RDATA:  0                       ;READ BUFFER
 5439
 5440          000001                          .END
```

```
ABLCNT  000740          1607#  1960   4628*  4642*  4665*  4674*
ACTLRC  021152          4213*  4306   4356#
ADRVN   000736          1606#  4543*  4553   4565   4567*  4581   4596   4631
AMOD1   022422          4563   4619#
AMOD1A  022432          4621#  4625
AMOD1B  022446          4623   4626#
AMOD1C  022602          4641   4645#
AMOD2   022616          4564   4651#
AMOD2A  022642          4657#  4662
AMOD2B  022662          4660   4663#
AMOD2X  022770          4654   4677#
APATS   015064          3618   3626#
AS      000526          1532#  4336   4337*
ASEQ    021766          3214   4529#
ASEQCF  000742          1608#  4538   4547*  4569
ASEQF   000734          1514*  1605#  1869*  1888*  1937   1958   2176   2195   3177   3211   3437   4572   4735
ASEQX   022174          4566   4569#
ASEQ0   022052          1939   4543#  4573
ASEQ1   022056          4544#  4568
ASEQ2   022134          4558#  4562
ASEQ3   022146          4559   4563#
ASEQ4   022156          4565#  4586
BA      000514          1527#  2308*  2361*  2497*  2513*  2698*  2707*  2929*  2938*  3028*  4126   4275
BAER    021136          4122   4128*  4221   4271   4350#
BBC     000656          1582#  3754*  3818*  3822*  3910*  3911   3917*  3918*  3919*  3920   3922*  3944*
BCNT    000710          1595#  4007*  4030*  4033*  4038*  4059*  4062*  4066*  4071*
BDPP    000716          1598#  3993*  4012*  4013   4041*  4046*  4055*  4057*  4060   4064*
BD00    001412          1634   1737#
BD10    001432          1635   1739#
BD20    001452          1636   1741#
BD30    001472          1637   1743#
BD40    001512          1638   1745#
BD50    001532          1639   1747#
BD60    001552          1640   1749#
BD70    001572          1641   1751#
BKRT    012236          2498   3050#
BKSP    012060          2622   2635   3025#
BKTM    012142          3033   3035#
BKTM0   012204          3039   3043#
BLCNTR  000654          1581#  1916*  1957*  1960   1962*  2473   4619*  4655*  4743
BPKP    000720          1599#  3992*  4020*  4021   4040*  4045*  4056*  4058*  4069   4073*
BP00    001212          1626   1721#
BP10    001232          1627   1723#
BP20    001252          1628   1725#
BP30    001272          1629   1727#
BP40    001312          1630   1729#
BP50    001332          1631   1731#
BP60    001352          1632   1733#
BP70    001372          1633   1735#
BTADDR  001032          1645#  2467   2567
BTFLG   000724          1601#  2110   2116   2120   2133*  2501*  2525*
BTOV    007162          2480   2524#
BTOVX   007324          2553   2559#
BTOV0   007202          2528#  2577
BTOV1   007212          2531#  2551
BTOV2   007300          2548   2552#
```

```
BTOV3   007316          2556#   2558
BTPRT   007326          2068    2135    2564#
BTPRT1  007376          2575    2577#
BTPT    000730          1603#   2467*   2468    2470*   2471    2478    2528    2547    2555    2567*   2568    2574
BTSTF   000726          1602#   2067*   2069*   2552
BTUR    007402          2488    2581#
BTO0    001612          1645    1758#
BTO1    001716          1646    1760#
BTO2    002022          1647    1762#
BTO3    002126          1648    1764#
BTO4    002232          1649    1766#
BTO5    002336          1650    1768#
BTO6    002442          1651    1770#
BTO7    002546          1652    1772#
BO      012214          3030    3036    3042    3045#
B1      012262          3051    3054#   4755
B2      012272          3056#
CADER   021134          2368*   2738*   3040*   4120*   4279    4349#
CC      000530          1533#   4200    4295    4322
CCNTR   012316          1972    3095#
CHNFLG  003042          1871#   1880*   4592    4651
CKSWR   024530          5019#   5083
CKSWRR= 104004          5069    5088#
CLLAST  015254          3678    3680#
CLP     015364          3663    3691    3699#
CLPE    015410          3700    3702    3706#
CLPO    015420          3708#   3714
CLP1    015432          3709    3711#
CLP2    015472          3718    3722#
CLP3    015504          3720    3723    3725#
CLO     015172          3662#   3679
CL1     015220          3670#
CL2     015242          3667    3676#
CL3     015326          3690#   3694
CNTG    024572          3001    4496    5027#
CNTLU   024600          1936    5029#   5040
CONER   021140          4174*   4251    4351#
COUNT   024524          5017#   5036*   5046    5061*
CRCER   021150          4204*   4291    4355#
CRCLRC  015154          3450    3465    3658#
CRCSV   021156          4194*   4346    4358#
CS      000520          1529#   1941*   1982*   3215*   3223*   3225    3252*   3253*   4155    4259    4410*   4580*   4581*
                        4583
C1      000510          1525#   2106*   2109*   2230*   2231*   2255*   3206    3224    3229    4153    4164    4255    4335*
                        4338    4449*   4463*
C2      000542          1538#   1983*   2105*   2158*   2229*   2249*   2266*   3254*   4341*   4600*
DATA0   002774          1834#
DATA1   002776          1835#
DATA10  003014          1842#
DATA11  003016          1843#
DATA12  003020          1844#
DATA13  003022          1845#
DATA14  003024          1846#
DATA15  003026          1847#
DATA2   003000          1836#
DATA3   003002          1837#
```

E10

F10


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DATA4   003004          1838#
DATA5   003006          1839#
DATA6   003010          1840#
DATA7   003012          1841#
DATBL   002772          1833#   3457
DATER1  001132          1689#   2044    3839*
DATR    015104          1975    3441    3637#
DATRO   015122          3641#   3644
DATO    014414          1834    3479#
DATOA   014446          3486#   3494    3498    3501
DATOB   014454          3487#   3488
DATOC   014520          3492    3499#
DATOD   014526          3502#   3510
DATOE   014536          3504#   3509
DATOF   014550          3506    3508#
DAT1    014560          1835    3515#
DAT1A   014564          3516#   3525    3548    3553    3601
DAT1B   014570          3517#   3519
DAT10   014702          1842    3568#
DAT10A  014714          3571#   3575
DAT11   014732          1843    3580#
DAT11A  014740          3582#   3585
DAT12   014752          1844    3590#
DAT12A  014762          3592#   3595
DAT13   014774          1845    3600#
DAT14   015004          1846    3605#
DAT14A  015016          3608#   3612
DAT15   015034          1847    3617#
DAT15A  015040          3618#   3624
DAT15B  015050          3620#   3622
DAT2    014600          1836    3524#
DAT3    014604          1837    3529#
DAT3A   014612          3531#   3542
DAT3B   014616          3532#   3535
DAT4    014630          1838    3540#
DAT5    014640          1839    3547#
DAT6    014646          1840    3552#
DAT7    014654          1841    3557#
DAT7A   014670          3560#   3563
DB      000532          1534#
DCHK    015546          2783    2978    3754#
DCHKO   015576          3758    3761#
DEREV1  001172          1711#   2064    3841*
DEREX   016624          3912    3933    3935    3943    3951    3954    3956#
DEREX1  016656          3957    3960    3962    3964#
DERFL   000704          1593#   3755*   3832    3965*
DERR    016162          3825    3872#
DERRO   016172          3874#   3963
DERROA  016222          3876    3881#
DERROB  016254          3887    3890#
DERROC  016300          3894    3897#
DERROD  016302          3896    3898#
DERR1   016330          3902    3905#
DERR2   016332          3904    3906#
DERR3   016346          3909#
DERR4   016350          3873    3908    3910#
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G10

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DERR4A  016510            3927    3936#
DERR4B  016552            3921    3944#
DERR5   016606            3948    3952#
DERR6   016620            3924    3946    3955#
DFX     016160            3833    3835    3840    3842#
DF0     016052            3781    3820#   3829
DF0A    015746            3791    3793#   3830
DF0A0   015770            3797    3799#
DF0A1   016004            3802    3804#
DF0A2   016020            3807    3809#
DF0A3   016034            3812    3814#
DF0A4   016040            3794    3816#
DF0B    015706            3782#
DF0B0   015730            3785    3788#
DF0C    015666            3774    3778#
DF0C0   015676            3764    3766    3768    3780#
DF0D    015652            3770    3775#
DF0E    015644            3772#   3777
DF0F    015636            3769#   3773
DF1     016064            3817    3821    3824#
DF2     016074            3819    3823    3826#
DF3     016112            3827    3831#
DF4     016154            3838    3841#
DOUT    024306            3898    3906    4962#   4979    4981
DOUTD   024374            4977#
DOUT1   024322            4965#   4966    4975
DOUT2   024354            4969    4972#
DOUT3   024362            4971    4973#
DPC     017000            4004#   4050
DPCG    017006            4005    4007#
DPC0    017014            4008#   4042
DPC0A   017056            4016    4018#
DPC1    017064            4011    4020#
DPC1A   017112            4024    4026#
DPC2    017154            4009    4014    4022    4036#
DPC2A   017116            4019    4027#
DPC2B   017140            4031#   4034
DPC3    017204            4039    4043#
DPPRT   017252            2015    4018    4026    4052#
DPPRTX  017406            4072    4075#
DPPRT0  017322            4060#   4065
DPPRT1  017346            4063    4066#
DPPRT2  017362            4069#   4074
DROP    016770            3999    4002#
DRPK    016756            3995    3999#
DRPKF   016670            3824    3986#
DRP1    001012            1634#   3993    4028    4046    4055
DRP2    001014            1635#
DRP3    001016            1636#
DRP4    001020            1637#
DRP5    001022            1638#
DRP6    001024            1639#
DRP7    001026            1640#
DRP8    001030            1641#
DRVER   021142            2369*   2739*   4185*   4237    4261    4312    4352#
DS      000522            1530#   1984    1998    2074    2107    2136    2159    2161    2232    2250    2252    2312    2366
```

H10

H10

		2715	2717	2719	2725	2736	3038	4175	4265	4411	4427	4432	4601
DSUP	014202	2001	3435#										
DSO	014210	3437#											
DSOA	014272	3444	3452#										
DSOB	014270	3448	3451#										
DSOC	014232	3438	3440	3443#									
DS1	014320	3436	3458#	3645									
DS2	014340	3462#	3464										
DS2A	014350	3459	3465#										
DS3	014354	2785	2979	3466#									
DS4	014364	3468#	3470										
DT	000536	1536#	3255	3260	3264	3458	4582						
DVN	000550	1544#	1982	3218	3223	3253	4410	4631*	4698				
DOFL	014556	3341*	3479	3482*	3511#								
EMADDR	000652	1580#	2140*	2236*	2306*	2358*	2495*	2510*	2689*	3027*	3037*	3048*	4242	4247
		4474											
EOPB1	000744	1609#	1915*	1931	1933*	2201*							
EOTCO	002652	1777#	2128*	2129									
EOTREC	000660	1583#	2112	2114*	2218*	2314	2316*	2317*	2318*	2402	2625	2646	2648*	2649*
		2650*	2681	2685*	2686	2723*	2724*	2795	2803					
ER	000524	1531#	4168	4179	4228	4269	4316							
ERCHK	017410	2322	2768	2971	4101#									
ERPT	020236	2370	2740	3041	4187	4189	4191	4199	4212	4216	4218#			
ERPTG	020272	4223	4227#											
ERPTG1	020340	4232	4237#											
ERPTT	020256	4222#	4225											
ERPTO	020354	4230	4236	4238	4240#	4333								
ERPT1	020422	4246	4248	4251#										
ERPT2	020460	4252	4261#											
ERPT3	020516	4262	4271#											
ERPT4	020560	4272	4281#											
ERPT5	020602	4282	4287#											
ERPT5A	020664	4292	4302#											
ERPT6	020726	4303	4312#											
ERPT7	021000	4313	4315	4319	4325#									
ERPX	021036	4327	4330	4332	4334#									
ERPXO	021002	4239	4326#											
ERPX1	021100	4226	4342#											
ERPX2	021132	4343	4345	4348#										
ERSAV	000722	1600#	2335	2383	2437	2828	2862	2894	4220*	4228*				
ERTFL	000732	1604#	2486*	2504	2507*									
ERO	017424	4103	4105#											
EROA	017474	4113	4117#											
EROB	017442	4107	4110#											
ER1	017502	4111	4119#											
ER10	020200	4208	4210#											
ER2	017506	2373	2517	2766	2963	2969	3044	3055	4116	4118	4120#			
ER2A	017552	4131#	4136	4146										
ER2AO	017522	4123#	4125											
ER2A1	017542	4127	4129#											
ER2B	017566	4130	4135#											
ER2C	017612	4141#	4150	4152										
ER2D	017626	4138	4145#											
ER2E	017654	4148	4151#											
ER3	017662	4132	4134	4142	4144	4153#								
ER3A	017724	4158	4164#											

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ER3A1	017762	4170	4172#											
ER3B	017770	4160	4163	4167	4174#									
ER4	017774	4154	4165	4173	4175#									
ER4A	020040	4178	4185#											
ER4A1	020032	4181	4183#											
ER6	020044	4176	4184	4186#										
ER6A	020130	4193	4198#											
ER7	020162	4203	4205#											
EXCRC	015540	3685*	3695	3735#	4194	4196*	4202	4300	4346*					
EXLRC	015542	3697*	3736#	4195	4197*	4211	4310	4347*						
FC	000516	1528#	2307*	2360*	2496*	2511*	2697*	2914*	2942*	3031*	3049*	4131	4141	4285
		4450*												
FCER	021144	4133*	4143*	4281	4353#									
FCSAV	000632	1569#	2090	3336*										
FMCNT	000556	1547#	2090*	2307	2697	2701	2755	2932	2942	2952	3099*	3327*	3328	3330
		3335*	3336	3637	3658	3686	3756	3778	3782	3790	3932	3936	4101	4139
		4438	4629*	4666*	4768									
FREX	021216	4370	4375	4378#										
FRPRT	021160	2896	3880	4244	4369#	4423	4476							
FRO	021210	4372	4376#											
HDRFL	000664	1585#	3831*	3875	4772*									
HERE	005130	2189	2195#											
HRDS	022216	4544	4578#											
HRDS0	022256	4585#	4589	4610										
HRDS1	022264	4584	4587#											
HRDS2	022332	4593	4595	4597	4600#	4608								
HRDS3	022354	4602	4605#											
HRDS4	022366	4606	4609#											
INTRF	000566	1551#	3358	3360	4451	4634*								
LRCER	021146	4214*	4217*	4302	4354#									
LRCSV	021154	4195*	4347	4357#										
MCRLF	027601	5044	5432#											
MR	000534	1535#	4205	4455*	4517*									
MSG1	025056	3878	5095#											
MSG10	025137	3027	3048	5113#										
MSG100	026772	2186	2199	5353#										
MSG101	027013	4549	5356#											
MSG102	027027	4551	5359#											
MSG103	027036	4555	5361#											
MSG104	027047	4536	5363#											
MSG105	027064	2429	2848	5366#										
MSG106	027077	2122	5368#											
MSG107	027167	2582	5378#											
MSG108	027252	4529	5388#											
MSG109	027266	2118	5390#											
MSG11	025144	4700	5115#											
MSG110	027320	2448	5395#											
MSG111	027342	2454	5398#											
MSG112	027354	2572	5400#											
MSG113	027375	2031	2051	5404#										
MSG114	027406	2036	2056	5407#										
MSG115	027417	2884	5410#											
MSG116	027442	4430	5414#											
MSG12	025160	4696	5118#											
MSG120	027513	1885	5421#											
MSG13	025174	2535	4741	5121#										

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MSG14	025202	2540	4745	5123#
MSG15	025207	3915	5125#	
MSG16	025240	4376	5131#	
MSG16A	027124	2131	5372#	
MSG17	025243	4373	5133#	
MSG2	025063	3891	5097#	
MSG20	025246	2125	5135#	
MSG21	025261	3356	5139#	
MSG22	025306	2728	5144#	
MSG23	025333	4253	5149#	
MSG23A	025341	4287	5152#	
MSG23B	025346	4273	5154#	
MSG23C	025353	4283	5156#	
MSG23D	025360	4257	5158#	
MSG23E	025366	4263	5160#	
MSG23F	025373	4267	5162#	
MSG23G	025400	5164#		
MSG23H	025405	4320	5166#	
MSG23I	025412	5168#		
MSG23J	025417	5170#		
MSG23K	025424	5172#		
MSG23L	025431	5174#		
MSG23M	025436	5176#		
MSG24	025443	4477	5178#	
MSG25	025463	4424	5182#	
MSG26	025503	4052	5186#	
MSG27	025514	4067	5189#	
MSG28	025525	2549	2564	5192#
MSG3	025070	3899	5099#	
MSG30	025527	3179	5193#	
MSG31	025601	3176	5201#	
MSG32	025643	3233	5208#	
MSG33	025664	3270	5212#	
MSG34	025700	3282	5215#	
MSG35	025713	3315	5218#	
MSG36	025734	3325	5222#	
MSG37	025760	3337	5227#	
MSG38	026003	3365	5231#	
MSG4	025075	3881	5101#	
MSG40	026023	3376	5234#	
MSG41	026051	3385	5239#	
MSG42	026063	3394	5242#	
MSG43	026103	4839	5053	5246#
MSG44	026107	2984	5248#	
MSG45	026136	5253#		
MSG46	026150	5256#		
MSG47	026155	5258#		
MSG48	026162	2165	2259	5260#
MSG49	026214	1989	2079	5266#
MSG5	025102	2306	4418	5103#
MSG50	026230	3262	5268#	
MSG52	026255	3216	5272#	
MSG53	026277	3294	5277#	
MSG54	026312	2358	4247	5280#
MSG55	026321	3037	5283#	
MSG56	026330	4249	5286#	

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MSG57   026334          3257    5288#
MSG58   026355          4293    5291#
MSG59   026363          4304    5293#
MSG6    025107          2140    2236    2689    4421    5105#
MSG60   026371          2142    4705    5295#
MSG61   026375          4711    5296#
MSG62   026401          4718    5297#
MSG64   026405          2347    2397    2838    5299#
MSG65   026427          2016    2431    2450    2850    2873    5304#
MSG66   026440          2495    5307#
MSG67   026453          2510    5310#
MSG68   026463          2046    5313#
MSG69   026474          3347    5315#
MSG7    025114          4766    5107#
MSG70   026512          2238    5319#
MSG71   026546          3227    5324#
MSG72   026567          2026    5327#
MSG73   026600          2021    5329#
MSG74   026611          3183    5331#
MSG75   026634          3192    5335#
MSG76   026647          2061    5337#
MSG77   026660          2041    5339#
MSG78   026671          2339    2387    2441    5341#
MSG79   026732          2832    2866    5347#
MSG8    025121          4728    5109#
MSG9    025131          3266    5111#
MTC1    000672          1588#   2309*   2359*   2512*   2708*   2710*   2917*   2919*   2939*   2941*   3032*   3050*   4110
                        4129    4135    4190    4342    4369    4371    4416    4434    4453    4456    4461*   4463    4748
MTINT   021750          1508    3202    4516#
MTINTA  021752          4482    4517#
NOP   = 000240          1464#
NRTP    011262          2341    2389    2443    2834    2868    2894#
NRZOF   000650          1579#   4531    4640    4653
OCTP    024052          4905#   5082
OCTPE   024060          4907#   5032
OCTPE1  024066          4906    4908#
OCTPG   024242          4917    4920    4927    4931    4936    4941    4943    4947#
OCTPG0  024260          4948    4950    4952#
OCTPG1  024264          4912    4953#
OCTPP = 104002          2020    2025    2030    2035    2040    2045    2050    2055    2060    2065    2130    2434    2453
                        2457    2534    2539    2544    2571    2853    2876    2895    2987    3186    3195    3265    3318
                        3329    3340    3350    3359    3368    3379    3388    3397    3890    4061    4070    4256    4260
                        4266    4270    4276    4280    4286    4290    4297    4301    4307    4311    4324    4554    4561
                        4699    4704    4710    4717    4727    4740    4744    4761    4765    4771    5087#
OCTP0   024106          4909    4911    4914#
OCTP1   024130          4915    4919#
OCTP2   024136          4918    4921#
OCTP3   024226          4913    4944#
OFL     024304          4905*   4907*   4910    4949    4952*   4958#
OUT     025006          5020    5022    5026    5048    5065#
PAPRT   022772          1988    2012    2078    2115    2141    2164    2237    2258    2338    2386    2440    2581    2727
                        2831    2865    3877    4017    4025    4241    4415    4429    4473    4696#
PAPRTA  023146          4732#   4738
PAPRTB  023162          4731    4735#
PAPRTC  023176          4736    4739#
PAPRTD  023204          4734    4741#
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PAPRTY  023300  4756  4759#
PAPRTO  023074  4715  4717#
PAPRT1  023250  4749  4752#
PAPRT2  023302  4754  4760#
PAPRT3  023304  4751  4758  4761#
PARCNT  015544  3706*  3710*  3717  3737#
PARS    014412  3447  3449*  3471*  3472*  3475#
PATRN   000560  1548#  3339  3342  3439  3443  3453  4632*  4636*  4638*  4645*  4668*  4670*  4672*
                4675*  4737  4739
PATS    014410  1914*  2182*  3100*  3443  3454*  3474#  3776*
PFLG    000670  1587#  3874*  3959  3964*  4240*  4329  4334*
PICK    017206  4000  4044#
PIK1    000772  1626#  3992  4029  4045  4056
PIK2    000774  1627#
PIK3    000776  1628#
PIK4    001000  1629#
PIK5    001002  1630#
PIK6    001004  1631#
PIK7    001006  1632#
PIK8    001010  1633#
PRB     000622  1565#  3483*  3490
PRS     000620  1564#  3484*  3486*  3487
PSW     000604  1558#  1918*  4464*  4470*  4487*  5075*
RANBAS  000624  1566#  2087*  4643*  4784*  4785
RANG    023356  3097  3115  3641  4784#  4787  4789
RANSAV  000626  1567#  2088*  3098*  3099  3116  3642  4644*  4784  4785*  4786  4788
RANSET  004374  1908  2087#  2181
RCNT    000554  1546#  2089*  2305  2475  2648  2680  3045  3116*  3317  3319  3324  4630*  4667*
                4752  4764
RCNTR   012356  1978  3113#
RCSAV   000630  1568#  2089  3324*
RDA     007774  2682  2684  2689#
RDATA   033612  2497  2698  2738  2748  2929  2951  2965  3028  3040  3043  3054  3467  3505
                3762  3884  3929  3942  4114  4117  5438#
RDCMD   000562  1549#  2602*  2611*  2615  2623*  2630*  2636*  2640  2644*  2683  2691  2699  2713
                2742  2749  2772  2791  2801  2855  2887  2915  2930  2949  3780  3828  3837
                3886  3893  3901  3907  3926  3947  3994  4112  4147  4215  4750
RDERR1  001152  1700#  2049  2744*  2776*
RDER1   001112  1678#  2029  2746*  2774*
RDER2   001114  1679#
RDER3   001116  1680#
RDER4   001120  1681#
RDER5   001122  1682#
RDER6   001124  1683#
RDER7   001126  1684#
RDER8   001130  1685#
RDEX    010702  2802  2804  2806  2808  2812#
RDFL    015152  1502*  1893*  2183*  3435  3646*  3648#
RDRTG   010776  2841#  2883
RDRTX   011260  2890  2892#
RDRTY   010710  2777  2825#
RDRTO   010722  2826  2828#
RDRT1   010754  2830  2836#
RDRT1A  010752  2835#
RDRT1B  010772  2837  2840#
RDRT2   011054  2847  2854#
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RDRT3   011076            2856    2859#
RDRT4   011102            2858    2860#
RDRT5   011104            2845    2861#
RDRT5A  011150            2864    2871#
RDRT5B  011160            2870    2873#
RDRT6   011210            2872    2878    2881#
RDRT7   011254            2888    2891#
RDSW    024526            5018#   5043*
RDX     010706            2813#
RD0     010032            2692    2694    2697#   2800    2811
RD1     010100            2704    2707#
RD1A    010114            2700    2710#
RD1B    010122            2709    2711#
RD1D    010130            2712#
RD10    010626            2794    2796    2798#
RD11    010636            2799    2801#
RD2     010134            2711    2713#
RD2A    010154            2717#   2718
RD2B    010164            2716    2719#
RD3     010214            2714    2720    2722    2725#
RD4     010244            2726    2732#
RD4A    010342            2737    2748#
RD4A0   010374            2750    2755#
RD4A1   010416            2758    2761#
RD4A2   010440            2752    2754    2764    2766#
RD4B    010446            2735    2768#
RD4C    010452            2767    2769#
RD4D    010502            2773    2776#
RD4E    010506            2775    2777#
RD5     010516            2733    2770    2779#
RD6     010540            2745    2747    2780    2782    2784#
RD7     010564            2787    2789#
RD7A    010614            2792    2795#
READ    007734            2612    2624    2637    2645    2680#
REGS    000544            1542#   3185    3187    3204
REOT    004426            2105#   2408    2503    2527    2627    2651
REOTC   005160            1948    1950*   2145*   2151*   2152    2153*   2154*   2203#   2219*   2220    2221*   2222*   3170*
                          3306*   3312    3313*   3314*   4578*   4611*   4613*
REOTX   005056            2177    2181#
REOTXX  005142            2185    2199#
REOT1A  004474            2111    2114#
REOT1B  004522            2117    2120#
REOT1C  004542            2121    2125#
REOT1D  004546            2126#
REOT1E  004566            2124    2131#
REOT1F  004536            2119    2123#
REOT2   004610            2136#   2139
REOT2A  004646            2137    2145#
REOT3   004674            2146    2151#
REOT4   004724            2157#   2173
REOT5   004740            2159#   2160
REOT6   005004            2162    2169#
REOT7   005034            2174#
RETRY   000602            1557#   2882    4235
RETURN  021744            4495    4497    4502    4504    4506    4511#
RFHARD  002732            1811#   2039    2889*
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RFSOFT	002672	1788#	2034	2857*									
RPCNT	000700	1591#	2350*	2391*	2424*	2425	2456	2508*					
RRHARD	002752	1822#	2059	2891*									
RRSOFT	002712	1799#	2054	2859*									
RSEQ	007416	2006	2602#										
RSEX	007556	2614	2625#	2639									
RSF	007472	2610	2613#										
RSFR	007572	2608	2630#										
RSFRX	007732	2647	2652#										
RSFR0	007624	2634	2636#										
RSFR1	007636	2632	2638#										
RSFR2	007670	2641	2644#										
RSF0	007530	2616	2620#										
RSF1	007544	2619	2621	2623#									
RSR	007450	2606	2609#										
RSTAL	000572	1553#	2789	3378	3380								
RTCNT	000702	1592#	2349*	2394*	2433	2452	2462	2481*	2482	2840*	2852	2875	2881*	2882
		4233											
RTRN	000662	1584#	2310*	2362*	2514*	2711*	2920*	2943*	3033*	3051*	4518	4755	
RTYFL	000712	1596#	2325	2352*	2374	2400*	2415*	2524*	2778*	2842*	2976	4231	4757
RTY1	001052	1656#	1909	2019	2344*	2393*	2485*						
RTY2	001054	1657#											
RTY3	001056	1658#											
RTY4	001060	1659#											
RTY5	001062	1660#											
RTY6	001064	1661#											
RTY7	001066	1662#											
RTY8	001070	1663#											
RWND	005162	2002	2213#										
RWNDA	005174	2214	2216#	4627	4664								
RWNDX	005474	2247	2263#										
RWND0	005232	2223#	2243										
RWND1	005304	2232#	2235										
RWND1A	005342	2227	2233	2241#									
RWND2	005360	2225	2244#										
RWND3	005364	2245#	2256										
RWND4	005414	2250#	2251										
RWND5	005434	2254#	2262										
RWND6	005452	2253	2257#										
SCVFL	014152	1519*	3181	3374	3403*	3405#							
SERFL	000706	1594#	2328	2332*	2377	2422	2492*	2499	2509*	2518	2769	2784*	2841*	2844
		3834	4219*	4227*									
SN	000540	1537#	3268										
SNPG	024476	4992	4995	5001	5003	5005#							
SNPT	024420	3269	4986#										
SPFLG	000570	1552#	2184	3367	3369								
STAL	000666	1586#	1986*	2004*	2007*	2076*	2138*	2234*	2323*	2493*	2617*	2642*	2789*	2912*
		2921*	2925*	2927*	3025*	3052*	3056*	3079*	4460*	4468*				
STALL	012306	2005	2008	2324	2494	2618	2643	2790	2913	2928	3026	3057	3079#	3080
START	003030	1496	1520	1868#										
STARTA	003162	1503	1901#	2731										
STARTB	003166	1894	1902#											
STARTC	003154	1499	1897#											
STARTD	003252	1898	1917#											
STARTE	003244	1916#	2202											
STARTF	003224	1911#	1913											

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START0  003176          1904#  1906
START1  003456          1951#  2083
START2  003574          1970   1971   1973#
START3  003610          1974   1976#
START4  003624          1956   1977   1979#  1987   1992
START5  004314          2010   2070#
START6  004332          2074#  2077
START7  004362          1981   2000   2075   2082#  2150
START8  004370          2073   2083#
STAR1A  003470          1953#
STAR1B  003510          1954   1957#
STAR1C  003544          1959   1961   1966#
STAR4A  003704          1985   1993#
STAR40  003636          1980   1982#
STAUT   003140          1515   1884   1887   1892#
STAUTO  003416          1942#  4635   4637   4639   4646   4669   4671   4673   4676
STOP    025010          5068#  5084
STOPP = 104006          1991   2081   2144   2167   2198   2240   2261   2730   3958   4328   4426   4481   5089#
STP     004032          2013   2015#  2134
STPX    004300          2014   2067#
SUSWR   003264          1889   1919#
SWR     000606          1559#  1878*  1879*  1922   1926*  1929   1969   1973   1976   2009   2070   2213   2302
                        2320   2333   2345   2364   2381   2395   2404   2427   2446   2603   2607   2609   2613
                        2620   2631   2633   2638   2732   2779   2786   2825   2836   2846   2871   2945   2972
                        2998   3002   3035   3872   3913   3956   3961   4015   4023   4188   4229   4326   4331
                        4471   4479   4494   4730   5019   5031   5064*
SWREG   000176          1491#  1878   1926   1929   2998   4494   5019
TABLE   025044          5079   5081#
TAPG    021220          2311   2363   2515   2712   2922   2944   3034   3053   4409#
TAPG0   021232          4411#  4414
TAPG1   021274          4417   4421#
TAPG2   021306          4420   4424#
TAPG3   021316          4412   4427#
TAPG3A  021366          4435   4438#
TAPG3B  021402          4437   4440   4442#
TAPG3C  021422          4445   4448#
TAPG3D  021466          4452   4454   4456#
TAPG3E  021512          4459   4461#
TAPG3F  021350          4428   4434#
TAPG4   021540          4466#  4467   4469
TAPG5   021554          4470#
TAPG6   021616          4472   4479#
TAPG7   021626          4480   4482#
TBELA   024032          4896#  4899
TBELL   024026          4864   4895#
TCRLF   023656          4862   4867#
TCRLFA  023674          4870#  4873
TEMPST  024522          5016#  5035*  5056*  5057*  5058*  5060*  5064
TEMP1   000642          1576#  3241   3277   3289   3301   3485*  3491   3495*  3936*  3937*  3938*  3939   3941
                        3986*  3989*  3997*  4002   4047   4409*  4413*  4465*  4466*  4579*  4603*  4609   4611
                        4612*  4613   4809*  4814   4823*
TEMP2   000644          1577#  3235*  3236   3272*  3284*  3296*  3410*  3414   3496*  3503   3987*  3990*  3998*
                        4003   4048
TEMP3   000646          1578#  2436*  2444*  2458   2460*  2861*  2869*  2877   2879*  2988*  2994   3988*  4010
                        4049*  4977   4980
TEND    005102          2179   2186#  4571
```

C11


```
TEX     024024          4860  4894#
TIB     000640          1575# 4812  4817  4820  4827* 4828  4849* 4850* 4853  5023* 5024* 5025  5038
                        5041  5049  5051  5059* 5060
TINER   023534          4819  4822  4833  4836  4839#
TINF    000634          1573# 1892* 1897* 1901* 2175* 3166
TINP    012402          1940  3166#
TINPA   012412          3167  3169#
TINPB   012432          3173# 3175
TINPB0  012616          3207# 3210
TINPB1  012456          3178  3180#
TINPC   012644          3182  3212  3215# 3232
TINPX   014144          3375  3403#
TINP0   012750          3226  3233# 3245  3259  3310
TINP0A  013024          3244  3246#
TINP0B  013042          3242  3249#
TINP0C  013102          3255#
TINP0D  013124          3256  3260#
TINP0E  013150          3261  3266#
TINP1   013166          3270#
TINP2   013244          3278  3282#
TINP2A  013322          3290  3294#
TINP2B  013400          3302  3306#
TINP2C  013426          3248  3308  3311#
TINP3   013446          3315#
TINP4   013776          3374# 4509
TKB     000612          1561# 2982  2996  3000* 4488  4849  4880  5023
TKS     000610          1560# 1951* 2911* 2980  3005* 4846* 4847  4878  5021
TMEX    000564          1550# 2355  2693  2805  3029  3349  3351  4633*
TMFLG   000676          1590# 2357* 2401* 2417  2690* 2695* 2721  2734  2781  2793* 2807  2809* 2812*
                        2923  2947  2974  4137  4159  4166  4177  4192  4245  4344  4753
TOB     000636          1574# 1902  4277* 4298* 4308* 4732* 4762* 4858* 4859  4861  4863  4867* 4870*
                        4874* 4893  4896* 4944* 4954* 4962* 4964* 4967  4968  4973* 5005* 5007*
TOG     023724          4278  4299  4309  4733  4763  4865  4868  4871  4875  4878# 4885  4890  4892
                        4897  4945  4955  5008
TPB     000616          1563# 4853* 4893* 4970* 4972*
TPOS    014154          3281  3293  3305  3409# 3412
TPOS1   014166          3251  3413#
TPS     000614          1562# 4851  4891  4965
TRAP30  025016          1468  5075#
TSTAL   000576          1555# 2004  2007  2493  2617  2642  3025  3056  3396  3398
TTIN    023550          4846# 5085
TTINN = 104010          4811  5037  5090#
TTINT   021632          1484  4487#
TTINT0  021734          4491  4508#
TTIN1   023554          4847# 4848
TTIN2   023576          4851# 4852
TTOUT   023614          4858# 4866  4876  4900  5081
TTOUTT= 104000          1886  1990  2017  2022  2027  2032  2037  2042  2047  2052  2057  2062  2080
                        2123  2126  2132  2143  2166  2187  2200  2239  2260  2340  2348  2388  2398
                        2430  2432  2442  2449  2451  2455  2537  2541  2550  2565  2573  2583  2729
                        2833  2839  2849  2851  2867  2874  2885  2985  3180  3184  3193  3217  3228
                        3234  3258  3263  3267  3271  3283  3295  3316  3326  3338  3348  3357  3366
                        3377  3386  3395  3879  3882  3892  3900  3916  4053  4068  4243  4250  4254
                        4258  4264  4268  4274  4284  4288  4294  4305  4321  4374  4377  4419  4422
                        4425  4431  4475  4478  4530  4537  4550  4552  4556  4697  4701  4706  4712
                        4719  4729  4742  4746  4767  4840  5028  5030  5034  5045  5054  5086#
```

D11

CROSS REFERENCE TABLE -- USER SYMBOLS

TTR	023410	2993	3191	3200	3222	3240	3276	3288	3300	3323	3334	3346	3355	3364
		3373	3384	3393	3402	4535	4542	4809#						
TTR0	023416	4811#	4830											
TTR1	023440	4813	4817#											
TTR1A	023452	4818	4820#											
TTR1B	023464	4821	4823#											
TTR2	023514	4816	4831#											
TTR3	023522	4832	4834#											
TTR4	023530	4835	4837#											
TTR5	023532	4815	4838#											
UDES	000552	1545#	1955#	1968#	1983	1993	2105	2157#	2158	2228#	2229	2248#	2249	2265#
		2266	2703	2751	2757	2763	2934	2954	2960	2966	3279#	3291#	3303#	3445
		3471	3701	3719	3722	3757	3763	3765	3767	3784	3793	4106	4145	4169
		4180	4186	4198	4314	4341	4444	4702	4707	4714	4720			
UNP	000674	1589#	1952	1963#	1966#	2018	2023	2028	2033	2038	2043	2048	2053	2058
		2063	2082#	2127	2147	2155#	2156	2168	2170#	2171	2174#	2216	2217#	2223
		2242#	2244#	2245	2254#	2263#	2264	2330	2343	2379	2392	2464	2466	2484
		2566	2741	2771	2854	2886	3169#	3243	3246	3249	3307	3309#	3311#	3413
		3836	3991	4027	4044	4054								
UNX	000770	1622#												
UN1	000750	1614#	1943	1945#	1953	1955	1968	1979	2148#	2157	2169#	2172	2224	2226
		2228	2241#	2246	2248	2265	3172	3247#	3250#	3254	3414#	4557	4591	4620
		4656												
UN2	000752	1615#												
UN3	000754	1616#												
UN4	000756	1617#												
UN5	000760	1618#												
UN6	000762	1619#												
UN7	000764	1620#												
UN8	000766	1621#												
UPS	000714	1597#	2216#	2263										
VECT	000546	1543#	3194	3196	3201									
WC	000512	1526#	4289	4448#										
WDATA	027604	2308	2361	2368	2372	2513	2516	3452	3461	3502	3638	3660	3688	3761
		3779	3928	3940	4119	5435#								
WEX	006322	2304	2356	2365	2378	2382	2390	2400#						
WRITE	005524	2003	2302#											
WRTE	005540	2303	2305#											
WRTSB	006766	2416	2492#											
WRTSB0	007040	2501#	2520											
WRTSB1	007054	2500	2504#	2519										
WRTSB2	007064	2505	2507#											
WRTSB3	007140	2514	2516#											
WRTY	006364	2351	2399	2415#										
WRTYR	006416	2420	2422#											
WRTYTM	006412	2418	2421#											
WRTY0	006372	2416#	2426	2487										
WRTY1	006472	2428	2435#											
WRTY2	006474	2423	2436#											
WRTY2A	006540	2439	2446#											
WRTY2B	006556	2445	2450#											
WRTY3	006622	2447	2459	2462#										
WRTY3A	006640	2463	2466#											
WRTY4	006726	2479	2481#											
WRTY5	006762	2483	2488#											
WRW	006340	2404#												

```
WRWX    006362          2403    2407    2409#
WSTAL   000574          1554#   2323    3387    3389
WTER1   001072          1667#   2024    2331*   2380*   2465*
WTER2   001074          1668#
WTER3   001076          1669#
WTER4   001100          1670#
WTER5   001102          1671#
WTER6   001104          1672#
WTER7   001106          1673#
WTER8   001110          1674#
WTM     006054          2358#   2421
WTM0    006116          2362    2364#
WTM1    006160          2367    2372#
WTM2    006170          2371    2374#
WTM3    006200          2375    2377#
WTM4    006260          2385    2391#
WTM4A   006316          2396    2399#
W0      005544          2306#   2354    2419
W1      005606          2310    2312#
W2      005646          2313    2315    2320#
W3      005662          2321    2323#
W3A     005704          2326    2328#
W4      005770          2337    2343#
W4A     006016          2346    2349#
W5      006032          2329    2334    2342    2352#
W6      006042          2355#
XOR     015512          3664    3692    3696    3727#
XORS    015536          3661*   3676*   3680    3681*   3682*   3684*   3685    3689*   3697    3728    3729*   3730*   3731
                        3734#
YOZ     011276          2788    2843    2911#   2995
YOZA    011344          2916    2919#
YOZB    011352          2918    2920#
YOZC    011372          2920    2923#
YOZC0   011462          2935    2938#
YOZC1   011476          2931    2941#
YOZC2   011504          2940    2942#
YOZD    011524          2943    2945#
YOZD0   011626          2950    2965#
YOZD1   011652          2948    2971#
YOZD2   011620          2961    2963#
YOZD3   011644          2967    2969#
YOZD4   011600          2955    2958#
YOZE    011656          2946    2972#
YOZF    011706          2964    2970    2973    2975    2979#
YOZF0   011712          2977    2980#
YOZG    012004          2981    2983    2996#
YOZH    012050          3003    3005#
YOZI    012034          2997    2999    3002#
YOZ0    011316          2914#   3004
YSTAL   000600          1556#   2912    2927    2986    2989
$CNTG   027556          5027    5427#
$CTRLS  000746          1610#   4501*   4505*   4880*   4881*   4882    4884*   4886    4888*   4889
$ENDAD  005120          1476    1873    1934    2191#
$MNEW   027571          5033    5430#
$MSWR   027562          5029    5428#
$READ   024624          5035#
```

F11

```
CZTUAJO TM02-TU16/TE16 RELIAB   MACY11 30(1046)  25-MAY-84  11:41  PAGE 136
CZTUAJ.P11    25-MAY-84 11:33          CROSS REFERENCE TABLE -- USER SYMBOLS                    SEQ 0135

$SVPC = 000034          14740  1479
.     = 033614          14670  14690  1474   14750  14770  14790  14830  14900  14950  14980  15010  15070  15130
                        15180  15220  17220  17240  17260  17280  17300  17320  17340  17360  17380  17400  17420
                        17440  17460  17480  17500  17520  17590  17610  17630  17650  17670  17690  17710  17730
                        1833   54340  54370
```

G11

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CZTUAJO TM02-TU16/TE16 RELIAB   MACY11 30(1046)  25-MAY-84  11:41  PAGE 138
CZTUAJ.P11    25-MAY-84 11:33          CROSS REFERENCE TABLE -- MACRO NAMES                    SEQ 0136

$CHAIN   13610   1870
.$ACT1   13610   1472
.$EOP    13610   2188


. ABS.  033614     000


 ERRORS DETECTED:  0

 CZTUAJ,CZTUAJ/CRF/SOL/NL:TOC=CZTUAJ.SML/ML,CZTUAJ.P11
 RUN-TIME: 4 9 1 SECONDS
 RUN-TIME RATIO: 20/16=1.2
 CORE USED:  15K  (30 PAGES)
```